The Effect Of Family And Social Environment On Smoking Behaviour In Adolescence

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Abstract
   Background: Parental and peer smoking are considered major predictors of smoking in adolescence. We investigate the impact of family and social environment and parental anti-smoking socialization on the intensive and extensive margins of smoking for Greek adolescents.
Method and Material: Information on 873 adolescents was collected through a self-reported survey and regression analysis examined associations with five different smoking outcomes (current/lifetime smoking status/intensity and onset). Subgroup analyses and interactions provided further insights.
Results: Prevalence of adolescent smoking is high. Family and peer smoking habits and smoking restrictions at home reduce probability and intensity of smoking. Parental smoking increases probability of current smoking by 5%

(95% CI: 0.01-0.09) as does having all your friends smoking by 30% (95% CI: 0.16-0.45). Parental anti-smoking advice delays onset of smoking by 0.76 years (95% CI: 0.15-1.39) but does not affect current smoking.

Conclusion: Family and social environments play a significant role in preventing or promoting smoking and should be regarded as crucial factors when devising policy to curb adolescent smoking.

Keywords: Adolescent smoking, anti-smoking socialization, parental smoking, peer smoking

Introduction

With tobacco consumption being the leading cause of preventable death in the world smoking currently remains one of the biggest public health concerns (WHO, 2013). While adult smoking rates in Europe have decreased by about 5% since 2000 (OECD, 2012) adolescent smoking is reportedly on the rise (Wold et al., 2004). Greece displays one of the highest level of adult smoking in EU with at least 30% of the adult population smoking daily (OECD, 2012; Vardavas et al., 2007), yet around one in five boys and one in ten girls is found to smoke at least once a week (WHO, 2012) placing Greece below the EU average prevalence rate for girls and just about below for boys (Spyratos et al., 2012).

Despite such lower rates, interventions to prevent adolescent smoking are critical in slowing or halting the upward prevalence trends and increased tobacco related illnesses (Moeini et al., 2012). However, the reasons for the rising trends in adolescent smoking, especially when adult smoking rates are dropping, are not fully understood (Gilman et al., 2009). Three groups of factors have received attention for their influence on adolescent smoking: a) family (parental smoking, number of smokers in the family, parental permissiveness and probable approval), b) peer groups or friends (number of friends who smoke, and academic expectation by friends) and c) individual characteristics (e.g. gender, ethnicity, concerns with body-weight, attitudes to smoking) (Mayhew et al., 2000). Family environment exerts a direct impact on children's psychosomatic development.With family serving as a role model and principal guide for adolescents' future socialization, parents and parental antismoking socialization play an important role in smoking prevention in adolescence. Parental smoking behaviour is a major predictor of early onset of smoking in adolescents (Frech, 2012; Martínez-Hernáez et al., 2012; Sargent et al., 2012). Children experiencing parental smoking are significantly more likely to smoke compared with children of non-smokers (Nelson et al., 2011). According to the literature, having smoker mother increases odds of smoking by 1.7 times, whereas having mother who has ever smoked increases the odds by 3.4 times (Darling and Cumsille, 2003).

Spyratos et al.(Spyratos et al., 2012) showed that, in Greece, children of smokers or children with siblings who smoke are two times more likely to smoke, compared to children of non-smoking families, while other studies have shown that when both parents quit smoking, children's odds of daily smoking are reduced by 39% (Bricker et al., 2003). At the same time, a strong co-evolution of adolescents' friendship networks and smoking behaviour has been demonstrated (Mercken et al., 2009).

A recent study found that, peer and parent influences were mostly significant for girls but not for boys (Chassin et al., 1996), something confirmed by Waldron (Waldron, 1991) when examining the association between smoking initiation and friends smoking. In general, girls have been reported to be more susceptible to social influences than boys (Simons-Morton, 2002). Girls tend to have more smoking friends over time, although prevalence of smoking among 15 years olds and age of smoking onset is similar between genders (prevalence: 10.6% for girls and 9.2% for boys; onset: 14.2 for girls and 13.8 for boys) (Flay et al., 1998). Ethnicity, affluence, education and parental characteristic further exhibit strong links with smoking (Chassin et al., 1984; Proescholdbell et al., 2000).

Given Greece's status as a high adult smoking prevalence country and its current relatively small (but at risk and growing) adolescent smoking population this study contributes to the literature by focusing on the intensive and extensive margins of smoking behaviour examining differences between current and lifetime, as well as, onset behaviour. Particularly, associations between smoking, parental antismoking socialization and peer/network effects for a sample of 13-18 years old are discussed, while adjusting for a number of confounding factors and characteristics.

Methods and materials
Data and study sample

An anonymous, self-report survey on smoking habits was administered to a stratified random sample of junior high and high schools (i.e. 12–18 year olds) in Central Greece (Lamia - Larissa) during the period 01/10/2011 – 02/02/2012. The survey was supplemented with a number of structured and semi-structured interviews with high school students. Special abilities schools, church-schools and evening schools (mainly enrolling adults) were excluded from sampling due to generalizability and representativeness concerns. To ensure validity of the questionnaire content, the related Greek and international literature was reviewed, based on research on MEDLINE, EMBASE and CINAHL databases. The self-report questionnaire used in this research included questions on participants' demographics, smoking habits, knowledge and attitudes towards smoking, peers' and family's smoking habits and antismoking socialization. Out of the

1,000 questionnaires distributed, 873 of them were completed and returned (87% respond rate). Ethical approval for the survey was granted by the Ministry of Education and the respective Secondary education authorities of the two prefectures sampled.

Smoking outcomes

Five distinct outcomes of adolescent smoking were examined; a) ever a smoker (Yes / No), b) number of cigarettes smoked in one's life (less or / more than one packet), c) currently a smoker (Yes / No), d) number of cigarettes currently smoked per day (Up to or / more than 1 cig a day) and e) age of first cigarette.

Antismoking socialization and peer effects

Antismoking socialization was captured by two variables. Whether smoking is allowed at home (ie everywhere or in some / or no places) and how often in the last few months have parents talked to/advised adolescents about smoking (ie never, once or twice, more than three times). Peer-effects were captured by friend's smoking habits and the effect was further broken down to the extent of smoking within the adolescent's friends network.

Confounding factors and covariates

Analyses of the association between smoking behaviour of adolescents and parental or peer influences were adjusted for a number of covariates and confounding factors, i.e. socio-economic and demographic characteristics (age, gender, school marks, live with parents, pocket money), parental smoking, knowledge of smoking health effects (i.e. advice from professional, acknowledging smoking's health harm) and social-norms (i.e. believe smokers to be more attractive).

Statistical Analysis

Initially, cross-tabulations and chi-square statistics were used to present the differential antismoking socialization behaviour by parental smoking status. Univariate associations between adolescent current smoking, antismoking socialization and parental smoking were further examined by using chi-square statistics. To assess whether anti-smoking socialization practices were associated with adolescents' smoking, regression analysis was performed. Specifically, logistic regressions were specified for our four binary smoking outcomes, and least squares regression (OLS) for our continuous one.

To further examine the regulating effect of gender and parental influence, subgroup analyses by child gender and parental smoking status

were performed. Finally, models with interactions between child gender, parental smoking and parental advice on smoking were specified.

For all logistic models, interpretation was carried through marginal effects, which are presented in the tables. Marginal effects were computed as the first derivative (for continuous covariates) or as a discrete change in probability (for the categorical covariates) and were interpreted as percentage changes in the probability. For the OLS model, interpretation was based on the estimation coefficients which indicate a change (in years) in the onset age of smoking. The statistical package Stata 12.1 was used for all analyses.

Descriptive results

Table 1 presents sample descriptive statistics with the last column of significance showing whether there are statistically significant differences between smoking adolescents and non-smoking adolescents (i.e. columns 4 and 5). Out of 873 respondents, 50% were boys, 12% current smokers and 27.7% ever smokers. Of those who reported that are smokers, 29% had smoked more than 6 packs of cigarettes in their life. Of the current smokers 14.2% reported smoking more than 20 cigarettes per day, whereas 46.7% reported smoking up to one cigarette per day. The mean age of first cigarette was 13.7 years and the mean age of the whole sample 14.9 years. About 50% of the sample received school marks within the highest bracket, while comparing the marks distribution between smokers and non-smokers large differences were found with non-smoker exhibiting significantly better marks. Similarly, looking at the cohabitation statuses of smoker and non-smoker adolescents statistical differences were observed, with twice as many smokers living with either the father (4%) or mother (9%) alone compared to non-smokers (1.5% and 5%, respectively).

Antismoking socialization

Smoking adolescents appeared to receive approximately €33 more pocket money than non-smokers, tend to more often come from homes that at least one parent smokes (71%) or from homes with more relaxed rules on whether smoking is allowed in the house. 29% of smokers report that smoking is allowed everywhere in their house compared to only 12.5% of non-smokers. Antismoking family advice is similar across child's smoking status although non-smoking kids tend to receive advice more often. On average when parents are smokers, 17% of the respondents report that smoking is allowed everywhere at home, with the percentage increasing for children that smoke (32%) and decreasing for non-smoking adolescents (12.9%) (**Table 2**). Where neither parent nor children are smokers, adolescents report that smoking is allowed everywhere in the house in 11.2%

of the cases, compared to smoker children with non-smoker parents that reached 22.2%. When parents are smokers and children non-smokers, smoking is allowed only in the balcony or yard in 49% of the cases, in contrast to both parents and children smokers (25%). When parents are smokers but offer antismoking advice frequently, children are more often non-smokers (42.4%) than smokers (33.9%), whereas when smoking parents offer antismoking advice in one instance, the percentage of smoking adolescents is higher (23.7%) than that of non-smoking adolescents (10.3%) (**Table 2**).

Peers and attitudes

A high percentage (61%) of non-smokers report no smoking friends compared to 10% of smokers (**Table 1**). No statistical differences are found in acknowledging smoking's harmful aspect or on whether they have received professional info of smoking harm. However, three times as many smoking adolescents believe smokers to be more attractive compared to non-smoking adolescents.

Regression analysis results

According to the results of this study, males have 5% decreased probability of being current smokers, with 15% less chances to have smoked more than 1 packet in their lifetime and are 23% less likely to currently smoke at least 1 cigarette. Adolescents with high grades (17.1-20) have a 34% and 23% decreased probability of having ever smoked more than a packet and currently being a smoker, respectively. Age played also an important role, with age increasing the probabilities of being ever or current smokers as well as the number of cigarettes ever smoked (3.7, 3.6% and 5.2% respectively) (**Table 3**).

Adolescent smoking and family

When parents were smokers, children are 5.2% more likely to currently smoke (**Table 3**). Additionally, we find an association between having no restrictions in smoking place at home and smoking status in adolescents, with a higher probability of adolescent smoking, when they have smoker parents and no restrictions at home, of 8% being a current smoker and 28.7% of having ever smoked more than 1 cigarette (**Table S1**). We further find that when parents are smokers, frequent anti-smoking advice is associated with a decreased probability of children being ever smokers by 10%, whereas in cases of non-smoking parents, frequent advice is associated with an 81.9% increased probability of currently smoking more than one cigarette per day (**Table S2**).

Adolescent smoking and peers

The number of smoking friends plays a significant role on smoking status of adolescents. When some peers are smokers, the probability of the respondent being a current smoker is increased by 10%, while when all peers are smokers, the corresponding probability is 30% and the probability of having ever smoked is 57.9% (**Table 3**). Additionally, when all friends are smokers, the age of first cigarette smoked, is lowered by 1.3 years. However, for adolescents with non-smoking parents, in spite of having some smoking friends, the probability of smoking more than one cigarette a day drops by 74.6% (**Table S2**) whereas with smoking parents such association is insignificant (**Table S1**).

Adolescent smoking and knowledge or attitudes

Acknowledging that smoking is potentially harmful is associated with a decrease in the probability of smoking >1 cigarette per day of 45.3% (**Table 3)** and 61.9% (**Table S1)** when the respondents have smoking parents. When parents are non-smokers, information by professionals decreases the probability of adolescents being current smokers by 6.7% compared to those with smoking parents whose corresponding effect is insignificant (**Table S2**). Finally, considering smokers attractive is associated with an 11% higher probability of ever being smoker (**Table 3**).

Subgroup analysis

Higher grades (i.e. between 17.1 and 20) were linked with a decreased probability of ever being or currently being a smoker for both genders (**Table S3**, **Table S4**). An association between mothers living at home and a reduced probability (41.5%) of currently smoking >1 cigarette a day was identified for boys but not girls. Restrictions in places to smoke at home significantly reduce probabilities of being current or ever smoker in girls (8.7% and 14% less likely to be a smoker, respectively), while no such effect is identified for boys. Peers smoking effects are present in both genders, although the association is attenuated for boys as shown in the subgroup analysis. Girls are more prone to comply with professionals' advice compared to boys, with the former showing a 36% decreased likelihood of smoking more than one cigarette per day. Finally, boys are found to be less affected by attitudes towards smoker attractiveness compared to girls who display an increased probability of currently or ever smoking.

Interactions analysis

Models with two- and three-way interactions showed limited significance with the overall findings largely comparable. Family advice

becomes significant when looking at the number of cigarettes ever smoked with its influence more effective in reducing smoking for girls but not boys, while higher probabilities of increased smoking are observed for those with smoker parent who have received advice once/twice.

Discussion

The present study examines associations of anti-smoking socialization practices, peer/network effects and attitudes towards and knowledge of smoking facts with the intensive and extensive margins of adolescent smoking behaviour for a sample of Greek students.

We confirm past literature where parental smoking and house smoking rules or complete ban of indoor smoking are repeatedly shown to directly influence children's smoking habits (Frech, 2012; Green et al., 1991; Martínez-Hernáez et al., 2012; Petraitis et al., 1995; Sargent et al., 2012). Familial smoking habits expand the habitual nature of smoking for adolescents making it a second nature. Yet, findings on the effectiveness of family anti-smoking advice are mixed (Ertas, 2007; Otten et al., 2008). Similar to past studies, we find that frequent communication between parents and children about smoking is largely a risk factor for adolescents' smoking (Goldade et al., 2012; Huver et al., 2006) with frequency of communication negatively associated with self-efficacy (Fearnow et al., 1998). In contrast, anti-smoking advice is found elsewhere to result in lower risk of smoking for adolescents (Chassin et al., 1996; Fearnow et al., 1998; Goldade et al., 2012) albeit some argue that it is frequency rather quality of communication that deters adolescent from smoking (Otten et al., 2007). Ennett (Ennett et al., 2001) suggest that once adolescents start smoking parents tend to pass anti-smoking advice more frequently to induce smoking cessation. As such, the timing of communication is essential in the effectiveness of parental advice with advice at later stages of adolescence (Villanti et al., 2011) or following adolescents' experimentation with smoking (Henriksen and Jackson, 1998) having little success. The timing aspect of parental advice is also observed in our results where anti-smoking advice is found to delay the onset of smoking something that is confirmed elsewhere (Jackson and Henriksen, 1997).

While the family effect is strong, the tendency towards smoking is heavily affected by peer behaviour both in past literature and in the present study. The number of smoking friends plays a consistently significant role to the smoking status of adolescents (Friedman et al., 1985). Studies show that children from smoking family environment and with friends who smoke have higher chances to smoke (Clark et al., 1999; Kyrlesi et al., 2007). We further confirm past literature that the presence of non-smoking families or strong parental disapproval of smoking mediates peer effects (Sargent and Dalton, 2001).

Mothers are generally more positive about anti-smoking socialization practices in preventing smoking. An explanation may be the stronger everyday interactions that mothers better insight into events occurring in the family and more control over daily parenting matters (Amos and Bostock, 2007). However, the strong association we find between presence of mothers at home and reduced current smoking intensity for boys (not for girls) might be explained by bonds developed between mothers and sons during early childhood. In general, the way adolescents are approached by parents in their daily lives has significant effects. Even though school performance is associated with lower smoking, pressure regarding school performance has been found to considerably increase the risk of smoking among students of both sexes (Martínez-Hernáez et al., 2012).

However, the correlational nature of our findings is acknowledged. The lack of causality in our analysis often makes interpretation problematic. For instance, the finding of increased smoking along with increased anti-smoking advice can simply be a result of increased advice given towards adolescents that already smoke. In fact, Avenevoli and Merikangas (Avenevoli and Merikangas, 2003) found a bi-directional relationship between parents-child communication/rules and smoking habits, whereby adolescent smoking at baseline could be predicted, by parent-child communication and vice versa (Goldade et al., 2012). Similarly, although smoking behaviour is often found to be correlated among friends and subsequently attributed to be peer effects, it is possible that it is a result of selection of the adolescent into a group that already smokes (i.e. one chooses friends with similar habits rather than ones' friends push him towards a specific habit).

Conclusion

The intensive and extensive margins of current and lifetime smoking habits are examined for a sample of Greek youths. The prevalence of adolescent smoking is high and we find that family and peer smoking habits and smoking restrictions at home reduces probability and intensity of smoking, while parental anti-smoking advice has mixed effects. In conclusion, encouragement and adoption of anti-smoking socialization policies can form part of future public health campaigns against onset of adolescent smoking but may not be effective in reducing prevalence of current youth smoking. Although our sensitivity analyses have provided an in depth picture of the associations between adolescent smoking and antismoking socialization, parental and peer effects further research needs to focus on identifying causal pathways.

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Tables

Table 1: Descriptive statistics for all and by child current smoking status

	N	%	Child smoker %	Child non-smoker %	Significance
Ever smoker	872	.277			
Current smoker	850	.122			
Cigs in life					
A puff to less than 1 cig	211	.436			
2 - 25 cigs	211	.181			
26 - 99 cigs (1 to 5 Packs)	211	.091			
> 6 Packs	211	.294			
Up to 1 cig	120	.467			
2 – 5 cigs	120	.167			
6 – 20 cigs	120	.225			
> 20 cigs	120	.142			
Age of first cig	164	13.7			
Age	871	14.9	16.1	14.7	***
Male	869	.507	.471	.501	
School Marks					
10 - 13	857	.051	.167	.031	***
13.1 - 15	857	.174	.304	.151	
15.1 - 17	857	.264	.324	.255	
17.1 - 20	857	.511	.210	.563	
Cohabit					
Both parents	871	.839	.760	.859	**
Father	871	.017	.039	.015	
Mother	871	.057	.087	.048	
Other	871	.086	.115	.078	
Pocket Money	861	45.1	73.3	40.8	***
At least one parent smokes	827	.484	71.1	44.8	***
Smoking at Home					
Everywhere	773	.149	.289	.125	***
Only in Some areas	773	.211	.237	.203	
Balcony/yard	773	.494	.330	.529	
Nowhere	773	.146	.144	.142	
Antismoking Family Advice					
Never	701	.335	.306	.338	**

1 time	701	.124	.224	.109	
2 times	701	.161	.129	.166	
> 3times	701	.379	.341	.389	
Smoker Friends					
Noone smokes	835	.541	.100	.610	***
Only boys/girls smoke	835	.033	.050	.030	
At most/least 3 people	835	.372	.570	.345	
Everybody smokes	835	.053	.280	.015	
Professional info on smoking harms	857	.616	.592	.624	
Smoking bad for health	851	.937	.940	.940	
Smokers more attractive	844	.137	.277	.107	***

Notes: ** *p*<0.05; *** *p*<0.01. The last column (i.e. Significance) shows the results of testing for statistical difference in the characteristics between smoking adolescents and non-smoking adolescents (i.e. column 4 vs column 5). For characteristics that have multiple categories (i.e. School Marks, Cohabit, Smoking at Home, Antismoking Family Advice and Smoker Friends) the test compares and reports statistical differences in the proportions of all categories.

Table 2. Home smoking and antismoking family advice by parental and child smoking

	Child Non-smoker (%)		Child Smoker (%)	
	Parent Non-smoker	Parent Smoker	Parent Non-smoker	Parent Smoker
Home smoking				
Everywhere	11.18	12.90	22.22	32.35
Only in some areas	16.01	25.16	11.11	29.41
Balcony/yard	56.80	49.35	51.85	25.00
Nowhere	16.01	12.58	14.81	13.24
	p.val = 0.019		p.val = 0.054	
Antismoking Family Advice				
Never	33.65	33.58	29.17	32.20
1 time	11.43	10.33	16.67	23.73
2 times	18.73	13.65	20.83	10.17
> 3 times	36.19	42.44	33.33	33.90
	p.val = 0.272		p.val = 0.592	

Table 3. Marginal effects from multivariate analysis results of parental and peer effects on five outcomes of adolescent smoking status

	(a) Ever smoker	(b) Cigarettes ever smoked	(c) Current smoker	(d) Current # of cigarettes	(e) Age of first Cigarette
Age	0.037	0.052	0.036	0.019	0.673
	(3.72)***	(2.43)**	(4.55)***	(0.49)	(6.68)***
Males	-0.000	-0.151	-0.052	-0.231	0.037
	(0.01)	(2.87)***	(2.45)**	(2.71)***	(0.13)
Marks (13.1-15)	-0.095	-0.203	-0.098	-0.010	0.599
	(1.07)	(1.82)*	(1.43)	(0.07)	(1.34)
Marks (15.1-17)	-0.158	-0.296	-0.159	0.073	0.738
	(1.86)*	(2.77)***	(2.43)**	(0.54)	(1.66)
Marks (17.1-20)	-0.278	-0.339	-0.234	-0.127	0.430
	(3.31)***	(3.27)***	(3.62)***	(0.75)	(0.82)
Mother in the house	-0.027	-0.158	-0.036	-0.166	0.457
	(0.54)	(1.23)	(1.00)	(1.32)	(1.01)
Pocket money	0.001	0.001	0.000	0.001	-0.000
	(2.48)**	(2.51)**	(2.10)**	(1.41)	(0.12)
Parents smokers	0.038	0.032	0.052	0.181	0.310
	(1.24)	(0.55)	(2.53)**	(1.96)*	(1.09)
No restrictions in home smoking	0.121	0.166	0.071	0.038	-0.380
	(2.64)***	(2.24)**	(2.46)**	(0.42)	(1.30)
Parental anti-smoking advice 2 or less times	-0.033	0.016	-0.001	0.089	0.767
	(0.88)	(0.22)	(0.03)	(1.02)	(2.44)**
Parental anti-smoking advice >3 times	-0.054	-0.044	-0.016	0.063	0.621
	(1.51)	(0.69)	(0.63)	(0.63)	(2.05)**
Only boys/girls friends smokers	0.351	0.244	0.143	0.074	-1.605
	(3.64)***	(1.42)	(2.05)**	(0.42)	(1.47)
Some friends smokers	0.172	0.376	0.100	0.341	-0.581
	(4.68)***	(6.57)***	(4.30)***	(2.23)**	(1.59)
All friends smokers	0.579	0.549	0.305	0.611	-1.332
	(4.91)***	(5.45)***	(4.01)***	(4.35)***	(2.70)***
Information by professionals	-0.045	-0.086	-0.036	0.005	-0.117
	(1.42)	(1.29)	(1.49)	(0.05)	(0.44)
Believe smoking harmful	0.113	-0.056	0.066	-0.453	1.132
	(1.94)*	(0.38)	(2.14)**	(6.59)***	(1.50)
Smokers considered attractive	0.109	0.114	0.061	0.069	-0.058
	(2.15)**	(1.59)	(1.58)	(0.73)	(0.19)
Constant	--	--	--	--	1.443
					(0.93)
N	689	182	672	106	141

Notes: Robust standard errors in parentheses. * *p*<0.1; ** *p*<0.05; *** *p*<0.01. The first four outcomes (a) Ever smoker (Yes/No), (b) Cigarettes ever smoked (less or more than one packet), (c) Current smoker (Yes/No) and (d) Current # of cigarettes (up to or more than 1 cig a day)) are binary and are modelled through logistic regression, while the last one ((e) Age of first Cigarette) is treated as continuous and is modelled through a least squares regression. The coefficients for the first four models are given in marginal effects, while for the fifth model they are the standard OLS coefficients.

Supplementary material

Table S1. Multivariate analysis results of parental and peer effects on five outcomes of adolescent smoking status - when at least one parent is a smoker

	(a) Ever smoker	(b) Cigarettes ever smoked	(c) Current smoker	(d) Current # of cigarettes	(e) Age of first Cigarette
Age	0.033	0.018	0.044	0.012	0.787
	(2.38)**	(0.52)	(3.52)***	(0.21)	(7.01)***
Males	-0.014	-0.252	-0.093	-0.261	-0.045
	(0.34)	(3.47)***	(2.78)***	(2.74)***	(0.15)
Marks (13.1-15)	-0.077	-0.140	-0.103	-0.022	0.518
	(0.82)	(1.03)	(1.63)	(0.09)	(1.05)
Marks (15.1-17)	-0.099	-0.299	-0.127	0.115	0.992
	(1.10)	(2.07)**	(2.21)**	(0.55)	(2.01)**
Marks (17.1-20)	-0.281	-0.232	-0.262	-0.175	0.949
	(3.14)***	(1.60)	(4.41)***	(0.66)	(1.52)
Mother in the house	-0.006	-0.220	-0.010	-0.272	0.003
	(0.09)	(1.41)	(0.21)	(1.18)	(0.01)
Pocket money	0.001	0.001	0.001	0.001	0.001
	(2.58)***	(1.72)*	(1.57)	(1.13)	(0.45)
No restrictions in home smoking	0.100	0.287	0.083	0.145	-0.479
	(1.78)*	(3.51)***	(2.43)**	(1.37)	(1.41)
Parental anti-smoking advice <=2 times	-0.064	0.109	-0.058	0.099	0.691
	(1.09)	(1.05)	(1.39)	(0.76)	(1.96)*
Parental anti-smoking advice >3 times	-0.101	-0.036	-0.075	0.023	0.536
	(2.10)**	(0.37)	(1.95)*	(0.17)	(1.55)
Only boys/girls friends smokers	0.389	-0.723	0.177	-0.155	-1.130
	(3.23)***	(2.36)**	(2.12)**	(0.46)	(1.12)
Some friends smokers	0.182	-0.166	0.145	0.320	-0.448
	(4.08)***	(1.71)*	(3.18)***	(1.18)	(1.01)
All friends smokers	0.585		0.340	0.558	-1.109
	(3.64)***		(5.51)***	(2.12)**	(1.90)*
Information by professionals	-0.047	0.009	-0.009	-0.033	-0.225
	(1.01)	(0.09)	(0.25)	(0.29)	(0.75)
Believe smoking harmful	0.222	-0.438	0.049	-0.619	0.293
	(2.37)**	(1.04)	(0.70)	(2.11)**	(0.52)
Smokers considered attractive	0.055	0.050	0.008	0.073	0.102
	(0.89)	(0.49)	(0.17)	(0.63)	(0.25)
Constant	--	--	--	--	0.873
					(0.51)
N	360	98	348	72	94

Notes: Robust standard errors in parentheses. * $p<0.1$; ** $p<0.05$; *** $p<0.01$. The first four outcomes (a) Ever smoker (Yes/No), (b) Cigarettes ever smoked (less or more than one packet), (c) Current smoker (Yes/No) and (d) Current # of cigarettes (up to or more than 1 cig a day)) are binary and are modelled through logistic regression, while the last one ((e) Age of first Cigarette) is treated as continuous and is modelled through a least squares regression. The coefficients for the first four models are given in marginal effects, while for the fifth model they are the standard OLS coefficients.

Table S2. Multivariate analysis results of parental and peer effects five outcomes of adolescent smoking status - when both parents are non-smokers

	(a) Ever smoker	(b) Cigarettes ever smoked	(c) Current smoker	(d) Current # of cigarettes	(e) Age of first Cigarette
Age	0.045	0.100	0.034	0.130	0.417
	(3.15)***	(2.52)**	(3.47)***	(1.98)**	(2.12)**
Males	0.018	-0.004	-0.002	-0.635	-0.371
	(0.43)	(0.04)	(0.07)	(2.70)***	(0.54)
Marks (13.1-15)	-0.067	-0.368	-0.001	-0.006	0.441
	(0.56)	(1.83)*	(0.01)	(0.03)	(0.59)
Marks (15.1-17)	-0.168	-0.309	-0.069	-0.097	-0.465
	(1.46)	(1.62)	(1.77)*	(0.26)	(0.53)
Marks (17.1-20)	-0.212	-0.425	-0.120	0.383	-0.720
	(1.91)*	(2.53)**	(3.30)***	(1.20)	(0.85)
Mother in the house	-0.028	-0.164	-0.048	0.199	0.593
	(0.37)	(0.70)	(1.16)	(1.04)	(0.72)
Pocket money	0.000	0.002	0.000	0.003	-0.005
	(0.52)	(2.58)***	(0.24)	(2.32)**	(0.88)
No restrictions in home smoking	0.112	0.028	0.023	0.059	-0.000
	(2.07)**	(0.18)	(0.74)	(0.19)	(0.00)
Parental anti-smoking advice <=2 times	-0.023	-0.026	0.048	0.578	0.770
	(0.46)	(0.23)	(1.63)	(1.97)**	(1.26)
Parental anti-smoking advice >3 times	-0.007	-0.092	0.030	0.819	0.872
	(0.13)	(0.82)	(0.93)	(2.27)**	(1.57)
Only boys/girls friends smokers	0.175	0.449	0.120		-1.877
	(1.87)*	(2.39)**	(1.87)*		(0.95)
Some friends smokers	0.128	0.275	0.077	-0.746	-0.584
	(2.92)***	(1.59)	(2.60)***	(2.38)**	(0.93)
All friends smokers	0.340	0.421	0.126		-0.844
	(2.56)**	(2.27)**	(2.44)**		(0.93)
Information by professionals	-0.040	-0.181	-0.067	-0.176	0.002
	(0.96)	(1.94)*	(2.54)**	(0.95)	(0.00)
Believe smoking harmful	-0.003	0.213	0.199		3.220
	(0.02)	(1.02)	(3.62)***		(2.44)**
Smokers considered attractive	0.130	0.256	0.111	-0.162	-0.109
	(2.23)**	(3.12)***	(4.42)***	(0.76)	(0.20)
Constant	--	--	--	--	4.475
					(1.40)
N	329	64	324	28	47

Notes: Robust standard errors in parentheses. * $p<0.1$; ** $p<0.05$; *** $p<0.01$. The first four outcomes (a) Ever smoker (Yes/No), (b) Cigarettes ever smoked (less or more than one packet), (c) Current smoker (Yes/No) and (d) Current # of cigarettes (up to or more than 1 cig a day)) are binary and are modelled through logistic regression, while the last one ((e) Age of first Cigarette) is treated as continuous and is modelled through a least squares regression. The coefficients for the first four models are given in marginal effects, while for the fifth model they are the standard OLS coefficients.

Table S3. Multivariate analysis results of parental and peer effects five outcomes of adolescent smoking status – for adolescent boys

	(a) Ever smoker	(b) Cigarettes ever smoked	(c) Current smoker	(d) Current # of cigarettes	(e) Age of first Cigarette
Age	0.031	0.076	0.037	0.038	0.798
	(2.17)**	(1.99)**	(3.68)***	(0.90)	(5.15)***
Marks (13.1-15)	-0.106	-0.373	-0.062	-0.110	0.413
	(1.26)	(3.08)***	(1.41)	(0.80)	(0.74)
Marks (15.1-17)	-0.188	-0.401	-0.138	-0.157	0.750
	(2.30)**	(3.59)***	(2.98)***	(1.32)	(1.21)
Marks (17.1-20)	-0.283	-0.433	-0.141	-0.269	-0.069
	(3.60)***	(3.26)***	(3.33)***	(1.16)	(0.10)
Mother in the house	-0.005	-0.313	-0.009	-0.415	-0.339
	(0.06)	(1.31)	(0.22)	(2.96)***	(0.54)
Pocket money	0.001	0.002	0.000	-0.000	0.000
	(2.51)**	(4.09)***	(2.07)**	(0.12)	(0.01)
Parents smokers	0.032	-0.027	0.021	0.189	0.206
	(0.74)	(0.29)	(0.81)	(1.95)*	(0.50)
No restrictions in home smoking	0.088	0.105	0.044	-0.079	-0.763
	(1.64)	(0.91)	(1.65)*	(0.71)	(1.86)*
Parental anti-smoking advice <=2 times	-0.032	-0.036	0.025	0.057	1.100
	(0.60)	(0.28)	(0.79)	(0.42)	(1.98)*
Parental anti-smoking advice >3 times	-0.070	-0.051	-0.032	0.111	0.941
	(1.38)	(0.65)	(0.99)	(0.99)	(1.94)*
Only boys/girls friends smokers	0.335	-0.150	0.100	0.010	-3.709
	(3.80)***	(1.02)	(1.44)	(0.04)	(1.95)*
Some friends smokers	0.126	-0.148	0.084	0.050	-1.097
	(2.77)***	(1.38)	(1.92)*	(0.22)	(1.75)*
All friends smokers	0.581		0.174	0.243	-2.025
	(3.18)***		(3.30)***	(0.95)	(2.33)**
Information by professionals	-0.035	-0.202	-0.004	0.073	-0.333
	(0.76)	(1.86)*	(0.13)	(0.52)	(0.84)
Believe smoking harmful	0.130	0.134	0.109	-0.434	0.564
	(1.25)	(0.95)	(2.43)**	(2.53)**	(0.74)
Smokers considered attractive	0.006	0.266	0.006	0.186	0.505
	(0.09)	(3.81)***	(0.21)	(1.33)	(1.06)
Constant	--	--	--	--	1.398
					(0.62)
N	343	73	329	55	69

Notes: Robust standard errors in parentheses. * *p*<0.1; ** *p*<0.05; *** *p*<0.01. The first four outcomes (a) Ever smoker (Yes/No), (b) Cigarettes ever smoked (less or more than one packet), (c) Current smoker (Yes/No) and (d) Current # of cigarettes (up to or more than 1 cig a day)) are binary and are modelled through logistic regression, while the last one ((e) Age of first Cigarette) is treated as continuous and is modelled through a least squares regression. The coefficients for the first four models are given in marginal effects, while for the fifth model they are the standard OLS coefficients.

Table S4. Multivariate analysis results of parental and peer effects five outcomes of adolescent smoking status – for adolescent girls

	(a) Ever smoker	(b) Cigarettes ever smoked	(c) Current smoker	(d) Current # of cigarettes	(e) Age of first Cigarette
Age	0.047	0.011	0.037	-0.015	0.571
	(3.23)***	(0.32)	(3.06)***	(0.17)	(3.18)***
Marks (13.1-15)	-0.038	0.022	-0.032	-0.218	0.452
	(0.38)	(0.11)	(0.45)	(0.73)	(0.48)
Marks (15.1-17)	-0.060	-0.032	-0.053	0.021	0.894
	(0.62)	(0.15)	(0.77)	(0.08)	(1.02)
Marks (17.1-20)	-0.200	-0.085	-0.207	-0.442	0.749
	(2.10)**	(0.41)	(2.83)***	(1.41)	(0.80)
Mother in the house	-0.029	-0.104	-0.020	0.104	0.754
	(0.48)	(0.71)	(0.38)	(0.49)	(1.12)
Pocket money	0.000	0.001	0.000	0.004	-0.001
	(0.79)	(1.04)	(0.81)	(2.48)**	(0.21)
Parents smokers	0.048	0.110	0.084	0.259	0.287
	(1.16)	(1.14)	(2.56)**	(2.14)**	(0.70)
No restrictions in home smoking	0.141	0.229	0.087	0.303	-0.281
	(2.54)**	(2.05)**	(2.29)**	(1.61)	(0.61)
Parental anti-smoking advice <=2 times	-0.049	-0.040	-0.028	0.150	0.388
	(0.91)	(0.39)	(0.61)	(0.58)	(0.81)
Parental anti-smoking advice >3 times	-0.042	-0.044	-0.001	-0.078	0.180
	(0.88)	(0.42)	(0.03)	(0.48)	(0.41)
Only boys/girls friends smokers	0.242	0.265	0.156		-0.554
	(2.35)**	(0.77)	(2.31)**		(0.53)
Some friends smokers	0.192	0.523	0.125	-0.485	-0.649
	(4.33)***	(3.15)***	(3.27)***	(1.96)*	(1.21)
All friends smokers	0.364	0.663	0.258		-1.287
	(3.27)***	(3.71)***	(4.71)***		(1.93)*
Information by professionals	-0.040	-0.006	-0.037	-0.364	-0.031
	(0.91)	(0.05)	(1.03)	(3.61)***	(0.08)
Believe smoking harmful	0.174		-0.005		2.410
	(1.59)		(0.08)		(2.21)**
Smokers considered attractive	0.201	0.004	0.113	0.166	-0.483
	(3.30)***	(0.03)	(2.42)**	(1.12)	(0.94)
Constant	--	--	--	--	1.718
					(0.53)
N	346	89	343	44	72

Notes: Robust standard errors in parentheses. * *p*<0.1; ** *p*<0.05; *** *p*<0.01. The first four outcomes (a) Ever smoker (Yes/No), (b) Cigarettes ever smoked (less or more than one packet), (c) Current smoker (Yes/No) and (d) Current # of cigarettes (up to or more than 1 cig a day)) are binary and are modelled through logistic regression, while the last one ((e) Age of first Cigarette) is treated as continuous and is modelled through a least squares regression. The coefficients for the first four models are given in marginal effects, while for the fifth model they are the standard OLS coefficients.