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Broader versus closer social interactions in smoking

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Abstract In this paper, we examine the importance of two different peer effects as determinants in the adolescent's decision whether or not to smoke. One is measured at the class level and the other reflects the smoking behaviour of the adolescent's best friends. A nationally representative wave of Spanish data, collected in different state and private centres of secondary education and vocational training (14–18 years), and several linear probability models are used to estimate the role of peer effects. We find that a 10 % increase in the proportion of classmates is associated with a 3.6 points increment in the probability of smoking. Similarly, if the smoker's friends go from "only some" to "the majority", the probability of smoking increases by 39 points. Although both peer effects are significant if introduced separately, the class peer variable is not significant once the closer peer effect is introduced. Our work provides evidence to support the hypothesis that peer effects are important determinants of smoking among adolescents. This has implications for policy-makers, since the existence of peer effects would amplify the effects of interventions.

Keywords Tobacco consumption · Adolescents · Peer effect · Peer group

1 Introduction

According to the World Health Organization, smoking continues to be the leading global cause of preventable deaths, killing nearly 6 million people each year (WHO

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2011). Moreover, this number of fatalities will surely increase if current trends continue. Thus, the same report pointed out that, by 2030, tobacco will kill more than 8 million people, worldwide, each year. Certain authors have claimed that cigarette smoking has become a "pediatric disease" given the high proportion of adolescents who report having smoked (Alexander et al. 2001; Ali and Dwyer 2009). The same claim could be made for Spain (Duarte et al. 2006), where more than 28 % of students aged 14–18 years declared having smoked in the prior month.

It is, therefore, easy to understand the great efforts that most countries have made to reduce tobacco consumption in recent decades. At the same time, the majority of studies have estimated and analysed the efficacy of a range of policy measures in order to improve policy decisions. An important topic for policy makers is social interaction or peer effects. Thus, although it is generally claimed that one of the key factors influencing whether adolescents smoke, or not, is the smoking behaviour of their peers, even though empirical evidence for the existence and magnitude of such peer effects in smoking is not conclusive. Some papers report positive and significant peer effects (Ali and Dwyer 2009; Gaviria and Raphael 2001; Clark and Lohéac 2007; McVicar 2011), but others argue that the peer effects of smoking are much weaker than found in previous studies (Krauth 2007; Duarte et al. 2013) or even insignificant (Soetevent and Kooreman 2007).

The literature on peer effects, or social interactions, has grown significantly in recent years. A relatively recent review of theoretical work can be found in (Scheinkman 2008). An important landmark in this area is the work of (Manski 1993), who distinguishes three types of effects: endogenous, exogenous or contextual, and correlated effects. The endogenous effect, also known as peer effect, appears when the propensity to participate in a behaviour depends on the prevalence of this behaviour in the group. The contextual effects appear when the propensity to participate in a behaviour varies with the exogenous characteristics of the group. Endogenous and contextual effects are also known as social effects. Third, the correlated effects emerge because individuals in the same group tend to have similar behaviours, sharing similar characteristics or institutional environments. Few studies have examined simultaneously more than one measure of social interactions from the same data set (Holliday et al. 2010), although there are some notable exceptions (Holliday et al. 2010; De Vries et al. 2006).

The purpose of this paper is to deepen the empirical analysis of peer effects on smoking by considering the simultaneous use of two alternative measures of peer influence. One is defined at the class level and the other takes into account the smoking behaviour of the group of friends. The contribution of this study to the empirical literature on smoking peer effects consists in helping to determine the relevant group in which to estimate peer effects, and we suggest that, once we have controlled for closer peer effects, there is no gain in controlling for class-based peer effects.

2 Methods

The data analyzed in this paper come from the wave of the Spanish Survey on Drug Use in the School Population, 2004, carried out by the Spanish Government

Delegation for the National Plan on Drugs, constituting a nationally representative sample of the student population between 14 and 18 years old. The questionnaires were filled in confidentially in a classroom setting. The survey was carried out in state/public and private centres of secondary education and vocational training throughout the national territory.

The dependent variable in the study is *CigaretteConsumption*, a dichotomous variable which takes value 1 if the individual has smoked cigarettes during the prior 30 days and 0 otherwise. In our data, most occasional smokers are considered as non-smokers.

Two peer group variables have been considered. The first is a traditional measure of the peer effect computed at class level; the second constitutes an attempt to define a closer peer group variable. The first variable is computed for each student as the class average prevalence of tobacco consumption, excluding him/herself. The other peer group measure is obtained as the response to the following question "How many of your friends have consumed tobacco during the last month?", taking value 0 if none of them, 1 if only some of them, 2 if the majority and 3 if all of them.

Apart from these peer variables, other control variables are considered, including individual, family and school characteristics. Additionally, as we explain below, school fixed effects are taken into account in the analysis. The definition and a descriptive analysis of these variables can be seen in Table 1.

In order to examine the determinants of adolescent tobacco consumption, we estimate a model in which smoking participation by adolescent i belonging to class c in school k, Y_{ick}, is determined by:

$$Y_{ick} = \begin{cases} 1 & \text{if } Y^*_{ick} = \gamma P_{ick} + \beta X_{ick} + \varepsilon_{ick} \geq 0 \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

where P_{ick} is one or both of the peer measures, X_{ick} is a vector including demographic and socio-economic characteristics, and ε_{ick} is an error term normally distributed with mean zero and unitary variance.

In order to deal with the endogeneity of the peer variables and sorting problems, we implement the following strategy. First, we include school fixed effects in the estimation as additional regressors. This strategy eliminates the influence of unobserved school characteristics that might lead to sorting families into schools, and also helps to control any shared influences at the school level such as discipline or rules about smoking. Second, we use an instrumental variable approach to deal with any other correlation between the peer variables and the error term. Although it is tempting to use instrumental variables in a logistic regression given that the dependent variable is a dichotomous variable, Terza et al. (2008) have demonstrated that using two-stage regression methods, that substitute in the second stage the endogenous regressor by its predicted part obtained in the first stage, yields inconsistent estimates in nonlinear models. However, they argue that estimating a linear model using the same two-stage approach such as two-stage least-squares (2SLS) provides consistent results. Consequently, we estimate Eq. (1) by 2SLS.

The plausibility of using the average of the rest of the class variables as instruments (*Income*, *SmokerFather* and *WithoutFather*) can be justified by the following arguments. First, the selected instruments pass the conventional tests of

Table 1 Descriptive analysis

Variable	Definition	Mean (Std. Deviation)
Smoker	This takes value 1 if the adolescent has smoked more than one cigarette per day in the last month and 0 otherwise	0.286 (0.452)
ClassPeerGroup	Smoking prevalence in the class after eliminating the individual's influence	0.286 (0.160)
CloserPeerGroup	This takes value 0 if none of his/her friends consumed cigarettes during the last month, 1 if some of them consume, 2 if the majority of them and 3 if nearly all of them	1.430 (0.864)
Male	This takes the value 1 if the young person is male and 0 if female	0.492 (0.500)
Age14	This takes value 1 if the adolescent is 14 years old and 0 otherwise	0.142 (0.349)
Age15	This takes value 1 if the adolescent is 15 years old and 0 otherwise	0.277 (0.477)
Age16	This takes value 1 if the adolescent is 16 years old and 0 otherwise	0.349 (0.447)
Age17	This takes value 1 if the adolescent is 17 years old and 0 otherwise	0.168 (0.374)
Age18	This takes value 1 if the adolescent is 18 years old and 0 otherwise	0.064 (0.245)
WithoutFather	This takes value 1 if the adolescent lives without the father at home and 0 otherwise	0.121 (0.327)
HouseWifeMother	This takes value 1 if the mother is a housewife and 0 otherwise	0.325 (0.468)
SmokerFather	This takes value 1 if the father of the adolescent smokes and 0 otherwise	0.319 (0.466)
SmokerMother	This takes value 1 if the mother of the adolescent smokes and 0 otherwise	0.318 (0.466)
FatherDrinking	This takes the value 1 if he never drinks alcohol; 2 if he sometimes drinks; 3 only weekends; 4 almost everyday in moderation; 5 everyday a lot.	2.455 (1.058)
MotherDrinking	This takes the value 1 if she never drinks alcohol; 2 if she sometimes drinks; 3 only weekends; 4 almost everyday in moderation; 5 everyday a lot.	1.888 (0.901)
WithoutStudiesMother	This takes value 1 if the mother has not a basic school certificate and 0 otherwise	0.202 (0.401)
PrimaryStudiesMother	This takes value 1 if the mother has a basic school certificate and 0 otherwise	0.291 (0.454)
SecondaryStudiesMother	This takes value 1 if the mother has a secondary school certificate or vocational training and 0 otherwise	0.298 (0.458)
UniversityStudiesMother	This takes value 1 if the mother has a university diploma or a university degree and 0 otherwise	0.203 (0.402)

Table 1 continued

Variable	Definition	Mean(Std. Deviation)
WithoutStudiesFather	This takes value 1 if the father has not a basic school certificate and 0 otherwise	0.222 (0.415)
PrimaryStudiesFather	This takes value 1 if the father has a basic school certificate and 0 otherwise	0.26.9 (0.443)
SecondaryStudiesFather	This takes value 1 if the father has a secondary school certificate or vocational training and 0 otherwise	0.264 (0.441)
UniversityStudiesFather	This takes value 1 if the father has a university diploma or a university degree and 0 otherwise	0.225 (0.417)
Income	Available income per week of the adolescent (in euros)	16.228 (17.250)
PreUniversityTraining	This takes value 1 if the young person is enrolled in the university-oriented branch "Bachillerato" and 0 otherwise	0.371 (0.483)
StateSchool	This takes value 1 if the school is a state/public school and 0 otherwise	0.583 (0.493)
Class15	This takes value 1 if the adolescent attends a class with fewer than 15 students and 0 otherwise	0.139 (0.346)
Information	This takes value 1 if the adolescent studies at a school which has programmed information campaigns on the risks associated with tobacco, alcohol and drug consumption and 0 otherwise	0.754 (0.431)

significance and validity discussed in the next section. Second, references in developmental psychology on non-parental adults support the idea that parents have little direct influence on the peers of their children, and that children want to conform to their parents but they do not want to conform to parent's peers (Galbo and Demetrulias 1996; Chen et al. 2003). Consequently, adolescents are influenced by other parents only indirectly through peer behaviour. These are the characteristics an instrument must fulfil, i.e., it is related to the endogenous regressor but does not have direct influence on the dependent variable (or it is not correlated with the error term). Third, it has been pointed out that the importance of the contextual effects will be reduced by using instruments at the class-level, since when the reference group is broader, pupils are likely less exposed to the family background of their peers (Lundborg 2006). Consequently, under the assumption that there are not contextual effects, the average background characteristics of peers are natural instruments for average peer smoking (Gaviria and Raphael 2001).

3 Results and discussion

We have implemented two tests in order to have some confidence in the instruments. The first test is an F-statistic for the joint significance of the

instruments in the first stage. Second, we follow Wooldridge in order to check the over-identification restrictions (Wooldridge 2002), i.e., in order to verify that they are not correlated with the error term. This procedure consists of the following steps: we first estimate Eq. (1) by two stage least squares including both peer measures. We then regress the residuals obtained in the previous step on all the exogenous variables, including the instruments. Finally, the statistic NR_u^2 of this last regression follows a Chi squared distribution, under the null hypothesis of the validity of the instruments, with the degrees of freedom being the number of indentifying restrictions, this is to say, the number of instruments minus two (the number of peer variables). The instruments pass both tests whose statistics appear at the end of table of Table 2.

We have estimated three models which appear in Table 2. In the first column, we use the class-based peer effect variable. In the second column, we replace the class-based peer variable with our closer peer measure. In the last column, we include both peer variables. The peer effect estimates are listed at the top of the Table.

A noticeable result is that both peer effects are statistically significant when they are introduced alternatively. However, the estimates are quite poor when both peer variables are introduced simultaneously. Thus, all the variables appear to be not significant at the conventional level. The effect of the closer peer variable appears to be stronger, statistically speaking, as it would be significant at the 10.2 % level (p value $= 0.102$). This low significance can be due to the fact that the instrumented variables that appear as regressors in the second stage of the 2SLS procedure are highly correlated (correlation $= 0.696$), and to the fact that we are instrumenting the closer peer variable poorly, with instruments that only vary at the class level.

This assumption is supported by the following strategy. We consider re-estimating the three models to include a new instrument that varies at the individual level. In order to do so, we include an "exogenized" truancy variable as an additional instrument. Given that the rude truancy variable may share some common unobserved individual characteristics with the decision to smoke, we eliminate these unobserved elements, regressing the truancy variable on the exogenous variables. Two examples of these unobserved individual characteristics that can influence both truancy and smoking are rebelliousness and concern about the future. Thus, for example, there is a greater probability that more rebellious adolescents and those who are unconcerned about their future will tend to smoke and skip classes.

Given that the truancy variable is a discrete non-negative variable, we estimate a model for count data, i.e., a Negative Binomial model. We then use as a new instrument the predicted part of this variable, which is a function of exogenous variables and, consequently, we have removed the endogenous unobserved characteristics. The new set of instruments also passes the tests outlined above whose statistics appear at the end of table of Table 3.

The estimations of the three models appear in Table 3. An interesting result is that the coefficients in the first two models barely change in both tables, providing us with additional evidence that the new instrument is valid. Otherwise, the use of an endogenous instrument would provide inconsistent estimates and, consequently, they would differ from those that appear in Table 2. In contrast, the estimates of the

Table 2 Determinants of smoking decision

Variable	Model 1		Model 2		Model 3	
	Coeff	SE	Coeff	SE	Coeff	SE
ClassPeerGroup	0.363***	−0.108			−0.489	−0.540
CloserPeerGroup			0.395***	−0.107	0.832	−0.510
Male	−0.093***	−0.006	−0.050***	−0.013	−0.004	−0.055
Age15	0.084***	−0.011	−0.015	−0.031	−0.118	−0.123
Age16	0.212***	−0.014	0.040	−0.054	−0.147	−0.223
Age17	0.318***	−0.016	0.104	−0.066	−0.127	−0.274
Age18	0.373***	−0.020	0.134*	−0.075	−0.13	−0.313
WithoutFather	0.058***	−0.012	0.017	−0.017	−0.029	−0.057
HouseWifeMother	−0.029***	−0.007	−0.012	−0.008	0.006	−0.024
SmokerFather	0.036***	−0.007	0.012	−0.009	−0.014	−0.032
SmokerMother	0.062***	−0.007	0.038***	−0.01	0.009	−0.035
FatherDrinking	0.010***	−0.003	0.002	−0.004	−0.006	−0.011
MotherDrinking	−0.003	−0.004	−0.003	−0.004	−0.003	−0.006
PrimaryStudiesMother	−0.001	−0.013	0.015	−0.014	0.026	−0.024
SecondaryStudiesMother	−0.009	−0.012	0.009	−0.013	0.025	−0.027
UniversityStudiesMother	−0.011	−0.013	0.008	−0.014	0.026	−0.029
PrimaryStuidesFather	−0.006	−0.013	−0.028**	−0.014	−0.046	−0.029
SecondaryStudiesFather	−0.026**	−0.012	−0.042***	−0.013	−0.056**	−0.025
UniversityStudiesFather	−0.017	−0.013	−0.037***	−0.014	−0.057*	−0.031
Income/100	0.728***	−0.035	0.268**	−0.129	−0.227	−0.581
IncomeSquared/10,000	−0.374***	−0.027	−0.148**	−0.067	0.09	−0.283
PreUniversityTraining	−0.143***	−0.011	−0.066***	−0.023	0.019	−0.100
State School	−0.002	−0.071	−0.110	−0.077	−0.235	−0.181
Class15	−0.015	−0.013	0.001	−0.013	0.023	−0.033
Information	−0.055***	−0.008	−0.015	−0.011	0.018	−0.041
Intercept	−0.002	−0.069	−0.289**	−0.113	−0.588	−0.373
No. of observations	20,925		20,202		20,202	

Instruments: the average of *Income, SmokerFather* and *WithoutFather*

Significance of instruments for ClassPeerGroup: F = 522.27 (p value = 0.000)

Significance of instruments for CloserPeerGroup: F = 8.27 (p value = 0.000)

Wooldridge's over-identification test: χ^2 (1) = 0.302 < $\chi^2_{.95}$ (1) = 3.88

* Significant at the 10 % level; ** significant at the 5 % level; *** significant at the 1 % level

general model 3 clearly differ, supporting our intuition that instrumenting both variables with means at the class level yields problems of correlation and poor instrumentation. Thus, the use of this new instrument reduces the significance problems that appear in Table 2, where none of the variables in model 3 are significant at the conventional levels.

All in all, the previous results lead us to conclude that, once we have controlled for closer peer effects, there is no gain in controlling for broader peer effects, such

Table 3 Determinants of smoking decision

Variable	Model 1		Model 2		Model 3	
	Coeff	SE	Coeff	SE	Coeff	SE
ClassPeerGroup	0.372***	−0.108			−0.173	−0.216
CloserPeerGroup			0.404***	−0.092	0.517***	−0.174
Male	−0.093***	−0.006	−0.049***	−0.012	−0.037*	−0.020
Age15	0.083***	−0.011	−0.017	−0.027	−0.042	−0.044
Age16	0.211***	−0.014	0.036	−0.047	−0.01	−0.077
Age17	0.318***	−0.016	0.099*	−0.058	0.042	−0.095
Age18	0.373***	−0.020	0.128**	−0.065	0.063	−0.109
WithoutFather	0.058***	−0.012	0.016	−0.016	0.004	−0.023
HouseWifeMother	−0.029***	−0.007	−0.012	−0.008	−0.007	−0.011
SmokerFather	0.036***	−0.007	0.011	−0.009	0.004	−0.013
SmokerMother	0.062***	−0.007	0.037***	−0.009	0.030**	−0.014
FatherDrinking	0.010***	−0.003	0.002	−0.004	−0.001	−0.005
MotherDrinking	−0.003	−0.004	−0.003	−0.004	−0.003	−0.005
PrimaryStudiesMother	−0.001	−0.013	0.015	−0.014	0.018	−0.015
SecondaryStudiesMother	−0.009	−0.012	0.009	−0.013	0.013	−0.015
UniversityStudiesMother	−0.011	−0.013	0.009	−0.014	0.013	−0.017
PrimaryStuidesFather	−0.006	−0.013	−0.028**	−0.014	−0.033**	−0.016
SecondaryStudiesFather	−0.026**	−0.012	−0.042***	−0.013	−0.046***	−0.015
UniversityStudiesFather	−0.017	−0.013	−0.037***	−0.014	−0.043***	−0.017
Income/100	0.727***	−0.035	0.258**	−0.113	0.131	−0.202
IncomeSquared/10,000	−0.374***	−0.027	−0.143**	−0.060	−0.082	−0.101
PreUniversityTraining	−0.143***	−0.011	−0.065***	−0.021	−0.042	−0.036
State School	−0.002	−0.071	−0.112	−0.076	−0.146	−0.093
Class15	−0.015	−0.013	0.001	−0.014	0.008	−0.018
Information	−0.055***	−0.008	−0.015	−0.011	−0.006	−0.016
Intercept	−0.004	−0.069	−0.296***	−0.104	−0.367**	−0.145
No. of observations	20,925		20,202		20,202	

Instruments: the average of *Income, SmokerFather* and *WithoutFather* and predicted *Truancy*

Significance of instruments for ClassPeerGroup: F = 392.03 (p value = 0.000)

Significance of instruments for CloserPeerGroup: F = 8.51 (p value = 0.000)

Wooldridge's over-identification test: χ^2 (2) = 1.518 < $\chi^2_{.95}$ (2)= 5.99

* Significant at the 10 % level; ** significant at the 5 % level; *** significant at the 1 % level

as class-based peer effects. That is to say, only the closer peer effect appears to be significant. This result is in line with existing studies that assume social proximity to be the catalyst for peer effects. Some authors argue that a demographically similar group might be the "right" peer group for a given student (Hoxby 2000; Arcidiacono and Nicholson 2005).

This reasoning suggests that our preferred model is model 2, given that rejecting the significance of the class peer effect implies rejecting the more general model 3

in favour of model 2. Consequently, we will concentrate on model 2 (and refer to model 1 only in order to compare results with prior research using a similar peer measure). Moreover, given that using peer measures separately does not yield a correlation problem, we will focus on the first estimates in Table 2 rather than the second estimates in Table 3, thus eliminating any existing doubts about the instrument that varies at the individual level.

It is important to point out that our estimates of models 1 and 2 are in line with most of the literature. In Ali and Dwyer (2011), for example, the authors estimate similar models, with the difference being that they use as a closer peer variable the smoking behaviour of the nominated peers, which our data set does not provide us with. They also find that both the class and closer peer effect are significant. In addition, our class peer effect coefficient of 0.363 is very close to the 0.360 reported in that paper. According to our result, the probability that an adolescent becomes a smoker will increase by 3.63 points if he/she attends a class with ten percent more smokers.

In order to interpret the closer peer effect, we should note that the closer peer variable takes discrete values (0, 1, 2 and 3). Consequently, each unitary increment of this variable implies that the proportion of friends who smoke is approximately 33 % higher. Thus, when the peer variable increases by one unit, the probability of being a smoker increases by 39.5 points. This result appears to be very high, as an increase of this variable from 0 to 3 would imply an increase of 118 points and, for consistency, the total effect of this variable should not increase the probability by more than 100 points. However, this does not invalidate our estimates, as we explain below.

Wooldridge (2002) points out that the Linear Probability Model coefficients are easy to interpret and often appear to provide good estimates of the partial effects on the response probability near the centre of the distribution of the explicative variables. This indicates that the estimated coefficient should give a good approximation around the mean of the closer peer variable, when passing from 1 to 2, but not necessarily at the extreme values. This suggests that the effects at the extreme values should be lower, for reasons of consistency.

We can conclude that the probability of being a smoker increases as the proportion of smoker friends increases. Moreover, and compared with adolescents with only some friends who smoke, the probability of smoking increases by 39.5 points if the majority of friends become smokers. In addition, it is plausible to assume that the closer peer effect would be less intense when the number of smoker friends passes from none to some, and from the majority to all.

If we now focus on the remaining explanatory variables in model 2, we find that being male reduces the probability of smoking by 5 points. The estimates also suggest that the probability of smoking is greater, by 3.8 points, among those adolescents whose mothers smoke. The estimates also indicate that an increase of 10 Euros in disposable income would lead to an increase in the probability of being a smoker of 2.2 points.

Finally, it is worth highlighting two results that we derive from the analysis of the marginal effects. First, certain variables that are significant under model 1 are no longer significant under model 2, that is to say, when we use a narrower measure of

the peer variable. Second, although some variables, like *Income*, appear to be significant after using a narrower peer group, their quantitative impact is clearly smaller. This last finding is in line with Lundborg's suggestion (Lundborg 2006) that broadly-defined peer groups may not reflect the true reference group and, consequently, peer group behaviour will be measured with error, and biased estimates may result.

4 Conclusion

The objective of this paper was to go deeper into the analysis of smokers' social interactions by considering simultaneously two peer effects measures. The first is measured at the class level, and the second is related to the closer group of friends. We have estimated three linear probability models. In the first, we introduce the peer effect variable measured at the class level, in the second we include only the closer peer effect variable, and in the third we introduce both peer effect variables.

Our results reveal that peer effects are important in explaining the decision that adolescents face about becoming smokers, or not. Although our findings agree with most of the literature, that peer effects are significant determinants in the smoking decision, we also provide evidence that the traditional peer variable measured at the class level is no longer significant when a closer peer measure is introduced. This constitutes one of the most important findings of our work.

We have found positive and significant peer effects, but we claim that social interactions occur in the group of friends—not necessarily in the broader school environment. In this sense, the closer group seems to be more appropriate than the class group as the "relevant" reference group. The confirmation of these results is important for policy purposes. Since peer effects can act as "social multipliers", the identification of the group of friends as a relevant channel would imply that some of the traditional forms of policy intervention in preventing tobacco consumption among adolescents, often designed to be conducted in schools, could exert their influence beyond the school via the relationships with friends that do not attend the same school.

Manski recognises the difficulty of identifying endogenous peer effects, and the necessity of knowing the reference group (Manski 1993), but the reference group is not known a priori. Similarly, Manski (2000) argues that the proper composition of peer groups is an important unsolved problem in this literature, and little progress has been made since them. This paper makes a little contribution in this concern, thus, following the results found, we claim that social interactions occur in the group of friends and not necessarily in broader school environments. In this sense, closer group seems to be more appropriate than class group as the "relevant" reference group and we suggest the need for further discussion and research on the nature and definition of peer groups in order to confirm or reject our results.

Our study adds to previous literature providing new evidence that smoking is a widespread behaviour, not just by adult people but also by students aged between 14 and 18 years. It also helps in order to identify the factors that influence on such

behaviour. We have found that physical, family background and school characteristics are important variables in explaining the decision of being a smoker. The strong association between mother tobacco behaviour and youth smoking provides evidence about a possible causal link. This could be due to the fact that mothers that smoke take less care about this consumption, but also, because children could be less obedient when mothers do not observe the rules they are trying to impose upon their children.

As a result, not only should policy makers be involved in the battle of reducing this dangerous activity, but also families and teachers. Thus, it is clear that smoking is more likely among females and among older people. As a result, parents should pay more attention to these groups.

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