

# Alcohol abuse among adolescents: regional evidence from Spain

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## Abstract

The aim of this paper is to offer regional evidence from Spain on alcohol abuse among adolescents. Specifically, we identify the determinants of the decision to abuse alcohol with respect to the five most important regions of Spain, as well as for the country as a whole. To this end, we estimate Probit specifications using data drawn from the Spanish Surveys on Drug Use in the School Population corresponding to 1994, 1996 and 1998. The results first reveal patterns that are qualitatively similar, but quantitatively different. Similarly, it would appear that economic policies aimed at reducing the access of adolescents to alcohol may have a positive effect on reducing abuse. Finally, the results suggest that encouragement be given to healthy habits among young people, as well as to the fight against education failure and the launching of information campaigns that accurately portray the current lifestyle of adolescents.

**Keywords** Alcohol abuse, adolescents, Spanish evidence.

## Introduction

While alcohol abuse can initially generate a pleasant sensation of euphoria and a fall in anxiety levels among adolescents, these sensations can eventually lead to the perpetuation of consumption, in such a way that young people become alcohol dependent. From a socioeconomic standpoint, this dependence can be explained by using the rational addiction or the habit formation models.<sup>1-4</sup> However, when the level of alcohol consumption continues to increase, a number of physical and psychological problems can arise. Thus, in addition to directly affecting the liver and the stomach, alcohol also acts on

the brain, reducing concentration and reaction levels, which increases the risks of death or injury from, for example, traffic accidents. Similarly, it can lead to premature sexual contacts, with the resulting risk of unplanned pregnancies and the transmission of sexual diseases. Moreover, the cognitive processes of adolescents can be damaged and psychological disorders either provoked or accentuated. In this line, the individual may become accustomed to 'managing' his/her problems by consuming alcohol and, as a consequence, does not learn to truly solve them, in this way significantly postponing normal psychological development. These types of problems, affecting both current and future health, obviously imply a significant loss to the individual's human capital, thereby reducing the possibility of higher personal earnings.<sup>5,6</sup>

Thus, the abuse of alcohol among adolescents is clearly an important public health problem. As a consequence, it seems logical that society should think in terms of restrictive and preventative socioeconomic regulation that, in addition to including educational measures, also imposes effective fines. In this line, the Spanish government has presented a draft parliamentary bill on the prevention of alcohol consumption among adolescents. The main aspects of this proposed legislation are a ban on such consumption in the public highway, the imposition of a minimum age of 18 years for the purchase of alcohol, the strengthening of the current system of fines imposed on shops that sell alcohol to under-age adolescents and, finally, re-education measures for adolescent offenders in the form of compulsory community service.

The presentation of this draft bill has given rise to a wide-ranging political and social debate in anticipation of its passage through the Spanish Parliament, with the aim being to introduce new proposals that improve the initial contents of the bill. This paper represents an attempt to contribute to this debate, starting from the premise that the problem must be treated in a coherent

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manner and on the basis of a rigorous socioeconomic diagnosis of the situation at regional level. Only in this way can a set of proposals emerge that will offer the best solution for each particular region. Therefore, it is first necessary to determine the factors which explain alcohol abuse among Spanish adolescents, so that truly effective measures can be implemented. As an earlier example of such measures, the literature has confirmed that increasing the minimum legal age for buying alcohol has a significant negative effect on consumption and, similarly, that there is a clear inverse relationship between increasing taxes on alcohol and the abuse of this substance on the part of adolescents.<sup>7-10</sup>

Despite the undoubted importance of these two policy measures on consumption, the majority of previous articles have established that the socioeconomic situation of both the adolescent and his/her family are, in fact, the fundamental determinants of abuse. In this line, there is evidence that higher personal income levels are related with high consumption levels and, furthermore, that adolescents who have paid work exhibit a lower probability of alcohol abuse.<sup>11-14</sup> Moreover, other authors have pointed to the importance of the school, family and social context in the phenomenon of abuse: for example, the significant direct relationship between the consumption of alcohol on the part of adolescents and other family members; the fact that adolescents who live with their parents present a lower probability of abuse; and, finally, the inverse relationship between school success and the consumption of alcohol.<sup>6</sup>

In this context, complementary analyses from the area of social psychology also suggest that alcohol abuse among adolescents is a consequence of a broad set of factors which can usually be divided into two groups: (1) those factors which have an individual basis, that is, adolescents consume alcohol for the purpose of reducing personal stress, improving their morale or feeling happy; (2) those that have a social basis, which indicates that alcohol consumption usually makes social relationships easier and, as a consequence, helps to develop the function of integration into a peer group. This, in turn, leads to a sensation of community and to a feeling that the adolescent forms part of a group.<sup>15,16</sup> Thus, alcohol abuse is also related to the psychological characteristics of adolescents themselves, with these characteristics defining the response of this age group to the social

influences associated with their environment, more particularly, family and friends.

Against this background, the objective of this paper is to identify the determinants of the decision to abuse alcohol with respect to the five most representative regions of Spain (Andalucia, Catalonia, Galicia, Madrid and Valencia), as well as for the country as a whole. To this end, Probit models are estimated drawing on the information provided by the three available waves coming from the Spanish Surveys on Drug Use in the School Population (1994, 1996 and 1998). This specification, which allows the individual to decide about whether or not to participate in alcohol abuse, includes some standard socioeconomic variables as independent variables, such as gender, age, working parents or individual income, as well as a number of other psychosocial variables, for example, the perceived tobacco use in the family environment, risky or healthy social behaviour and self-evaluation about the dangers and addictive character of alcohol. The empirical results will hopefully allow for a better and more detailed understanding of alcohol abuse among young people in Spain, which must be the starting point when seeking to achieve the goal of effectively preventing the abuse of this substance.

The remainder of the paper is organized as follows. In the following section, the data used to model alcohol abuse among adolescents are described. Thereafter, consideration is given to the specification and estimation of the model, and to a discussion of the empirical results and policy implications. Finally, the paper closes with a summary of the most relevant conclusions.

### The data

The data used in this work come from the three available waves of the Spanish Surveys on Drug Use in the School Population, corresponding to 1994, 1996 and 1998, and carried out by the Spanish Government's Delegation for the National Plan on Drugs. These surveys contain complete information on both individual and family socioeconomic characteristics, as well as on some psychosocial factors related, for example, to school performance, healthy or harmful habits and the effects of available information on the consequences of drug consumption. All this information was obtained directly from the adolescents surveyed, who were aged between

14 and 18 years and who anonymously answered a complete questionnaire on drug use. Their parents were not present during the interviews and were not informed about the responses of their children, in this way avoiding any under-reporting in their responses to drugs use or other questions. The information was collected in different public and private centres of secondary education and vocational training. To ensure a representative sample, a random selection procedure was used to determine the two classrooms-by-centre where the adolescents were interviewed.

Mean and standard deviations of the variables used are given in Table 1. The dependent variable is Abuse, which indicates whether or not the adolescent has abused alcohol during the last 30 days. With respect to the independent variables, which reflect different factors that affect alcohol demand, we have included:

Gender, Age, WorkingMother, WorkingFather, StudiesMother, StudiesFather, Working, Income, FamilySmoking, EducFailure, Membership, Sport, Reading, Opinion and Information.

From a reading of this table, it can be appreciated that 31.7% of Spanish adolescents admitted to having abused alcohol during the last 30 days, with this percentage being higher in Galicia and Madrid and lower than this national mean in Andalusia, Catalonia and Valencia. As regards the independent variables, we note that 48.6% of the national sample corresponds to male adolescents and that the average age is 15.8 years. While only 43.4% of the adolescents have a mother who works outside the home, some 86.4% confirm that their father currently has paid employment. However, the education level of the parents is more similar, with that of both the father and the mother being somewhat higher

**Table 1** Definitions of the variables used

Variable	Definition
Abuse	This takes the value 1 if the adolescent has abused alcohol during the last 30 days (i.e. when the adolescent has stated that he/she has got drunk on one or more occasions during that period) and 0 otherwise
Gender	This takes the value 1 if the adolescent is male and 0 if female
Age	Age of adolescent
WorkingFather	This takes the value 1 if the father works and 0 otherwise
WorkingMother	This takes the value 1 if the mother works and 0 otherwise
StudiesFather	This takes values according to the studies level (1: no studies, 2: basic school certificate, 3: secondary school certificate, 4: first level of vocational training, 5: second level of vocational training, 6: superior secondary school certificate, 7: university diploma, 8: university degree)
StudiesMother	This takes values according to the studies level (1: no studies, 2: basic school certificate, 3: secondary school certificate, 4: first level of vocational training, 5: second level of vocational training, 6: superior secondary school certificate, 7: university diploma, 8: university degree)
Working	This takes the value 1 if the adolescent has a part-time job out of school hours and 0 otherwise
Income	Available income per week by the young person in constant 1998 Spanish pesetas
FamilySmoking	This takes the value 1 if the adolescent lives with other individuals who smoke and 0 otherwise
EducFailure	This takes the value 0 if the adolescent has not had to repeat a school year, 1 if he/she has had to repeat only one year and 2 if he/she has had to repeat more than one year
Smoker	This takes the value 1 if the adolescent has consumed tobacco during the last 30 days and 0 otherwise
Membership	This takes the value 1 if the adolescent is a member of some association of a political, religious or sport type and 0 otherwise
Sport	This takes values according to the frequency of participating in sport activities during the last 30 days (0: never, 1: less than once a week, 2: one to three times a week, 3: four to six times a week, 4: daily)
Reading	This takes values according to the frequency of reading books or magazines during the last 30 days (0: never, 1: less than once a week, 2: one to three times a week, 3: four to six times a week, 4: daily)
Opinion	This takes values according to the degree to which the young person considers him/herself to be informed on the negative consequences of alcohol consumption (1: if the young person does not consider him/herself to be well informed, 2: if he/she is partially informed, 3: if he/she is sufficiently informed, 4: if he/she is fully informed)
Information	This takes the value 1 if the young person studies at a school which has information campaigns on the risks associated with tobacco consumption and 0 otherwise

**Table 2** Means and standard deviations

	Andalucia	Catalonia	Galicia	Madrid	Valencia	National
Abuse	0.247 (0.431)	0.264 (0.441)	0.320 (0.467)	0.318 (0.466)	0.299 (0.458)	0.317 (0.465)
Gender	0.494 (0.500)	0.467 (0.499)	0.481 (0.500)	0.521 (0.500)	0.479 (0.500)	0.486 (0.500)
Age	15.847 (1.409)	15.826 (1.390)	16.030 (1.964)	15.669 (1.423)	15.739 (1.550)	15.795 (1.483)
WorkingFather	0.826 (0.379)	0.889 (0.314)	0.837 (0.369)	0.889 (0.314)	0.867 (0.340)	0.864 (0.343)
WorkingMother	0.337 (0.473)	0.570 (0.495)	0.445 (0.497)	0.464 (0.499)	0.447 (0.497)	0.434 (0.496)
StudiesFather	3.244 (2.244)	3.345 (2.176)	3.297 (2.111)	3.800 (2.411)	3.283 (2.182)	3.369 (2.218)
StudiesMother	2.839 (2.010)	3.106 (1.998)	3.080 (1.938)	3.424 (2.189)	3.010 (1.969)	3.104 (2.023)
Working	0.100 (0.300)	0.136 (0.343)	0.081 (0.273)	0.073 (0.260)	0.096 (0.294)	0.093 (0.291)
Income	2.779 (7.862)	3.568 (8.818)	3.176 (7.992)	2.692 (7.064)	3.026 (7.563)	2.953 (7.648)
FamilySmoking	0.664 (0.472)	0.613 (0.487)	0.629 (0.483)	0.660 (0.474)	0.685 (0.464)	0.649 (0.477)
EducFailure	0.407 (0.491)	0.333 (0.471)	0.395 (0.489)	0.351 (0.477)	0.362 (0.481)	0.357 (0.479)
Smoker	0.273 (0.446)	0.339 (0.473)	0.303 (0.460)	0.327 (0.469)	0.335 (0.472)	0.312 (0.463)
Membership	0.504 (0.591)	0.540 (0.498)	0.515 (0.500)	0.521 (0.552)	0.528 (0.680)	0.533 (0.553)
Sport	2.273 (1.381)	2.225 (1.356)	2.223 (1.372)	2.416 (1.318)	2.269 (1.342)	2.302 (1.349)
Reading	2.349 (1.289)	2.466 (1.294)	2.555 (1.305)	2.534 (1.276)	2.408 (1.262)	2.456 (1.294)
Opinion	2.935 (0.840)	2.997 (0.824)	3.055 (0.845)	3.114 (0.808)	3.046 (0.814)	3.001 (0.836)
Information	0.452 (0.498)	0.469 (0.499)	0.344 (0.475)	0.435 (0.496)	0.390 (0.488)	0.434 (0.496)

than secondary school certificate level. With respect to the personal economic situation, 9.3% of the adolescents state that they have some form of paid employment, with the average personal income being 2953 pesetas/week (in constant 1998 values). Other interesting information reveals that 64.9% of the respondents live with other family members who smoke tobacco. Moreover, 53.3% belong to some form of political, religious or sports-type association, and 43.4% have received information on the risk factors associated with drug use by means of informative campaigns carried out at their school or vocational training centre.

### The empirical model

The generic binary choice model applied to our case can be represented as:

$$Y_i = \begin{cases} 1 & \text{if } Y_i^* = x_i' \beta + u_i > 0 \\ 0 & \text{otherwise,} \end{cases} \quad (1)$$

where the variable  $Y_i$ , for any individual  $i$ , will take the value 1 if that individual has abused alcohol and 0 otherwise. Associated with this, there is a latent variable  $Y_i^* = x_i' \beta + u_i$ , where  $\beta$  is a vector of  $k$  parameters,  $x_i$  is a vector of  $k$  individual characteristics and  $u_i$  is a non-

observable random variable. This latent variable has a positive sign, that is,  $Y_i = 1$ , when the individual has abused, and a negative one,  $Y_i = 0$ , when he/she has not.

In accordance with the above, the probability that the individual does or does not abuse alcohol is given by:

$$\begin{aligned} Pr(\text{Abuse}) &= Pr(Y_i = 1) = Pr(u_i > x_i^* \beta) \\ &= 1 - F(-x_i' \beta), \end{aligned} \quad (2)$$

$$\begin{aligned} Pr(\text{NonAbuse}) &= Pr(Y_i = 0) = Pr(u_i < -x_i' \beta) \\ &= 1 - F(-x_i' \beta), \end{aligned} \quad (3)$$

where  $F$  denotes the distribution function of the random variable  $u_i$ , and with the likelihood function for the  $N$  individuals of the sample being:

$$L = \prod_{i=1}^N [1 - F(-x_i' \beta)]^{Y_i} [F(-x_i' \beta)]^{1-Y_i}. \quad (4)$$

If the random variable is distributed according to a normal distribution with mean zero and unitary variance, the previous model constitutes a Probit, while if it is distributed according to the logistical function, we obtain the Logit model. These specifications will allow us, when maximizing the likelihood function, to obtain estimates of the parameters and therefore of the effect that the individual variables have on the probability of abusing alcohol.

On the basis of the generic model, one of the most relevant aspects is to evaluate the effects that a change in the different independent variables can have on the probability of abuse. To this end, we start from the derivative of such a probability:

$$Pr(\text{Abuse}) = Pr(Y_i = 1) = F(\beta' x_i) \quad (5)$$

$$\frac{\partial E(Y_i = 1)}{\partial x_{ki}} = f(\beta' x_i) \beta_k \quad (6)$$

with  $f$  and  $F$  being the density and distribution functions of the standard normal. Equation 6 allows us to define the elasticity, which measures the percentage change in the probability of alcohol abuse when the  $k$  variable varies by 1%.

### Empirical results

In this section, consideration is given to the socioeconomic factors that hopefully provide an answer to the

central question raised in this paper, that is to say, why do Spanish adolescents abuse alcohol? The regional evidence presented here allows us to derive the similarities and differences between the five representative Spanish regions. In addition to this evidence, a national estimation obtained after including dummy variables for all 17 Spanish regions in order to capture possible unobserved heterogeneity in the sample. Thus, Table 2, which shows the estimations of the Probit models for the five representative regions as well as for Spain as a whole, first reveals that in general there are some common patterns in the socioeconomic factors that affect alcohol abuse, in the sense that the significant independent variables act in the same direction on the probability of such behaviour.

Starting with the physical characteristics of adolescents, it can be appreciated that gender has a significant influence on alcohol abuse in Andalusia, Madrid and Galicia, although in this last case only at the 10% level of significance, as well as at national level. In any event, the positive sign of these coefficients in all the regions shows that the probability of abuse is higher among male adolescents than among their female counterparts.

On the other hand, the age variable does have a significant influence in all the sample regions, save for Andalusia. This effect has been measured by means of two independent variables, namely, age and age-squared. The joint consideration of the two signs reveals that the probability of abuse increases with the age of the adolescent, but in a less than proportional manner, given that the parameters corresponding to the two variables are significant, but with opposite signs.

With respect to the effect of the labour situation of the parents on the probability of alcohol abuse, these independent variables are not significant in most of the sample regions, which can again be interpreted as the problem being so widespread that it transcends the traditional differences of social class or the presence of adults at home. However, some relevant results can be appreciated when these variables do appear to be significant. In particular, note that if the mother works outside the home, this increases the probability of abuse, with this variable being significant at the 5% level in Madrid and at 1% in the national sample. With respect to the labour situation of the father, this variable is not significant either in the five representative regions

**Table 3** Probit estimations

	Andalucia	Catalonia	Galicia	Madrid	Valencia	National
Intercept	-2.590 (-1.280)	-15.357*** (-4.991)	-11.971*** (-4.983)	-4.489*** (-3.078)	-8.035*** (-3.472)	-6.287*** (-11.153)
Gender	0.126*** (2.060)	0.078 (1.246)	0.147* (1.785)	0.229*** (3.889)	0.020 (0.301)	0.148*** (7.679)
Age	0.143 (0.592)	1.638*** (4.365)	1.193*** (4.319)	0.392** (2.314)	0.788*** (2.839)	0.593*** (8.959)
Age-squared	-0.004 (-0.576)	-0.047*** (-4.088)	-0.034*** (-4.256)	-0.010** (-2.096)	-0.023*** (-2.715)	-0.016*** (-8.338)
WorkingFather	-0.062 (-0.861)	-0.085 (-0.965)	0.065 (0.645)	-0.011 (-0.130)	0.005 (0.053)	-0.029 (-1.146)
WorkingMother	0.080 (1.366)	0.021 (0.352)	0.036 (0.485)	0.106** (1.981)	0.083 (1.343)	0.085*** (4.705)
StudiesFather	0.038*** (2.563)	-0.009 (-0.572)	0.040** (2.030)	0.002 (0.136)	0.013 (0.800)	0.011** (2.389)
StudiesMother	-0.004 (-0.233)	0.021 (1.136)	0.038* (1.715)	0.001 (0.037)	0.006 (0.308)	0.004 (0.827)
Working	0.111 (1.292)	-0.005 (-0.068)	-0.253* (-1.853)	0.117 (1.168)	-0.048 (-0.487)	-0.007 (-0.244)
Income	0.008*** (3.844)	0.004** (2.157)	0.012*** (4.726)	0.006*** (3.373)	0.008*** (3.914)	0.008*** (14.115)
Income-squared	0.0001*** (-3.954)	0.0001*** (-2.879)	0.0001*** (-3.234)	0.0001*** (-3.734)	0.0001*** (-3.760)	0.0001*** (-14.535)
FamilySmoking	0.165*** (2.760)	0.064 (1.059)	0.183** (2.387)	0.069 (1.205)	0.030 (0.460)	0.091*** (4.887)
EducFailure	0.139** (2.223)	0.030 (0.447)	0.198** (2.416)	0.127** (2.030)	-0.053 (-0.757)	0.077*** (3.823)
Smoker	0.680*** (11.933)	0.741*** (12.393)	0.658*** (8.869)	0.786*** (14.465)	0.795*** (12.526)	0.758*** (42.133)
Membership	0.066 (1.319)	0.090 (1.399)	0.008 (0.103)	0.080 (1.513)	0.065 (1.161)	0.012 (0.780)
Sport	-0.011 (-0.494)	-0.010 (-0.386)	-0.008 (-0.248)	-0.038* (-1.661)	0.007 (0.259)	-0.007 (-1.000)
Reading	-0.031 (-1.375)	-0.042* (-1.787)	-0.050* (-1.754)	-0.026 (-1.221)	-0.034 (-1.337)	-0.045*** (-6.407)
Opinion	0.048 (1.486)	0.066* (1.793)	0.104** (2.371)	0.006 (0.196)	0.063 (1.629)	0.046*** (4.307)
Information	-0.043 (-0.798)	-0.069 (-1.209)	-0.005 (-0.067)	-0.029 (-0.549)	0.162*** (2.655)	-0.017 (-0.953)
T94	-0.160** (-2.281)	-0.064 (-0.797)	-0.347*** (-3.628)	-0.420*** (-6.155)	-0.124 (-1.544)	-0.239*** (-10.547)
T96	-0.178** (-2.511)	0.047 (0.610)	-0.216** (-2.526)	-0.227*** (-3.421)	-0.116 (-1.442)	-0.094*** (-4.264)
No. observed	2842	2529	1588	2859	911	26 051
% Predicted	74.87	74.21	73.05	71.39	73.10	71.04
Log likelihood	-1472.9	-1301.4	-848.6	-1586.2	-479.6	-14 469.2

\* Significant at the 10% level, \*\* significant at the 5% level, \*\*\* significant at the 1% level.

t-Statistics are in parentheses.

or at national level. Thus, recalling that the father's labour situation has been traditionally used as an indicator of the economic level of the family, the results suggest that alcohol abuse is essentially independent of the economic situation of the family, in this way illustrating the ease of access and the scope of the problem in all the economic and social strata of the Spanish population.

The influence of the studies level of the parents on the probability of adolescent abuse of alcohol has also been analysed. The results show a significant and positive effect corresponding to the studies level of the father in two of the sample regions, Andalusia and Catalonia, as well as in the whole Spanish sample. By contrast, the corresponding effect with respect to the mother, which can be interpreted as a proxy for cultural habits in the family, is only significant and positive in the case of Galicia.

As regards the personal variables of the adolescents, the results show that having a part-time job is not significant, save for Galicia at the 10% level. Moreover, the income and income-squared variables have a significant influence on the probability of adolescent alcohol abuse for all the selected regions, as well as for Spain as a whole, with our dependent variable, alcohol abuse, increasing with available income, although in a less than proportional way.

As regards adolescents who share their home with smokers, such young people have a higher probability of abusing alcohol than those who do not live in this kind of environment, with this result being observed in all sample regions. Having said this, it should be noted that this independent variable is not significant in the three sample regions of Catalonia, Madrid and Valencia. The positive influence confirms the hypothesis that adolescents are more likely to abuse alcohol if their parents, siblings or other family members smoke.

The education failure variable also appears as a main determinant in the decision to abuse alcohol, with this effect being significant in Andalusia, Galicia and Madrid, as well as at the national level. This result is coherent with those of earlier studies, which suggest that poor academic results are associated with problematic social behaviour, such as the consumption of alcohol and other drugs. The most commonly cited interpretation of this result is that higher-ability students abuse

less because, given that they have successfully completed their schooling, they are presumed to be more intelligent and therefore capable of using their mental ability to rapidly absorb and act upon information on the harmful effects of alcohol abuse.

With respect to the habits of the adolescents, four variables have been included, namely, whether the individual has consumed tobacco during the last 30 days, whether he/she belongs to some type of political, cultural or sports association, whether he/she usually practises sport and, finally, whether he/she is a habitual reader. As regards the first, the smoker variable exerts a positive and significant influence on the alcohol abuse variable at both regional and national level, showing the complementarily behaviour of these two substances. The second and third variables are not significant and, with respect to the fourth, those adolescents who include habitual reading among their habits have a lower probability of abusing alcohol, with this result being confirmed in Catalonia and Galicia, as well as at the national level.

Additionally, in order to check the effect of informative campaigns on the probability of alcohol abuse among adolescents, two different variables have been employed, namely, opinion and information. With respect to this second variable, it can be observed that the information received by adolescents, whether in school or in other environments, is not significant in the majority of the cases. Thus, it would appear that information is not, in itself, sufficient to brake adolescent abuse. Rather, and as we have appreciated earlier, this information must be accompanied by effective policy measures capable of influencing the habits of both the individual and the peer group. However, as regards the opinion variable, this does appear to exert a positive effect on the probability of alcohol abuse in Catalonia and Galicia, as well as at the national level, in such a way that these adolescents undervalue the negative consequences associated with such behaviour under the belief that they can control their consumption.

As regards the two time dummy variables introduced with the aim of including the time evolution of the probability of abuse, it can be noted that the parameters associated with these variables are negative in all the regional and national samples, with these being significant in Andalusia, Galicia, Madrid and in Spain as a

whole. This indicates, *ceteris paribus*, an increasing trend in abuse during the course of the 1990s in Spain.

In Table 3, the effect of a relative change in the income on the probability of abuse, that is to say, the income elasticity evaluated at the mean of the variable, had been quantified. The first noteworthy result is that the income elasticity is, in all cases, positive and lower than one. The most sensitive regions to an income variation are Valencia (0.448), and Galicia (0.332), whereas the lowest elasticity values appear in Catalonia (0.116) and Madrid (0.159). There are no significant differences when differentiating by gender, although it can be observed that adolescent males show higher income elasticities than their female counterparts, especially in Andalusia, Valencia and Galicia. This would appear to confirm that economic policies aimed at adolescent incomes would be more effective if directed towards male adolescents in these specific regions.

In summary, the results indicate that when trying to explain the probability of abuse, it is possible to identify common patterns of behaviour in the Spanish regions. Thus, it can be observed that the probability of abuse increases with age in the majority of the sample regions, although at a less than proportional rate. It also emerges that increases in income also increase the probability of abuse, but this is not linear. Moreover, a more permissive

family environment with respect to tobacco use, and especially the adolescent's own smoking habit, tends to increase the probability of alcohol abuse by that adolescent. Thus, economic policies aimed at reducing the available personal income of adolescents, together with others directed towards habits and the school and family environment, could be effective in reducing the percentage of adolescents who abuse alcohol.

### Conclusions and policy implications

The objective of this paper was to shed more light on the regional patterns of alcohol abuse among Spanish adolescents, in the hope that legislators can use the findings in their policy-making decisions. To this end, a Probit model for each of the five most representative regions of Spain: Andalusia, Catalonia, Galicia, Madrid and Valencia, as well as for Spain as a whole, has been estimated using the three available waves from the Survey on Drug Use in the School Population (1994, 1996 and 1998).

The empirical results indicate, first, that male adolescents abuse alcohol with a higher probability than their female counterparts, although the differences are not significant in some regions. This would tend to confirm that the alcohol abuse problem transcends the traditional gender division and, instead, takes the form of a generalized problem within the adolescent population. Evidence has also been adduced that the probability of such abuse increases with age, although this is not proportional. Thus, it would appear to be the youngest age group, the under 16's, that are the most appropriate target for policy-makers with respect to any preventive measures.

As regards available personal income, in all regions this is a significant and positive determinant of the probability of abuse. Thus, policy measures that directly affect individual income could be effective in preventing alcohol abuse among adolescents. However, elasticities of 20–30% suggest that these measures must be accompanied by others aimed at the social environment of the adolescent population.

Focusing more specifically on this social environment, one of its more outstanding aspects is the relationship between parents and their adolescent offspring. In this regard, the results show that greater *laissez faire* in

**Table 4** Income elasticities

	Total	Male	Female
Andalusia	0.182*** (2.985)	0.192*** (3.053)	0.172*** (2.926)
Catalonia	0.116*** (2.636)	0.121*** (2.721)	0.112*** (2.574)
Galicia	0.332*** (2.785)	0.377*** (2.682)	0.290*** (2.885)
Madrid	0.159*** (3.152)	0.161*** (3.483)	0.157*** (2.878)
Valencia	0.448*** (3.905)	0.567*** (3.878)	0.330*** (3.965)
National	0.216*** (3.106)	0.225*** (3.308)	0.208*** (2.949)

\*Significant at the 10% level, \*\*significant at the 5% level, \*\*\*significant at the 1% level.

t-Statistics are in parentheses.



education, as well as a more reduced presence of the mother at home, have an influence on alcohol abuse, although this second variable is only significant at the national level. In this line, the Britain Institute of Alcohol Studies has stated that inadequate support and lax parental control can result not only in deviant drinking behaviour by adolescents, but also in lower levels of self-confidence and personal autonomy, as well as poor social skills.<sup>16</sup> This reveals the need to pay greater attention to the parent/adolescent offspring relationship, in the hope that communications between them can be improved and that a higher level of control is imposed over this kind of risky behaviour.

However, the responsibility for alcohol abuse among adolescents is not exclusive to the family environment. In fact, it has been found that in the majority of Spanish regions, education failure is another clear determinant of abuse. This failure is not only directly associated with alcohol abuse, but also with a loss of self-confidence, which indirectly leads adolescents to consume both alcohol and other addictive substances.

Another significant result is that alcohol abuse is accompanied by tobacco consumption on the part of adolescents. This suggests that both alcohol and tobacco are consumed in a complementary way and that those policies oriented towards tobacco reduction among adolescents could have a positive effect in reducing alcohol abuse. Moreover, it has also been found that habitual reading reduces the probability of adolescent alcohol abuse. However, no evidence was found that membership of some kind of association or the regular practising of sports exerts any significant effect on the dependent variable.

With respect to the influence of informative campaigns on the negative consequences of alcohol abuse, the results indicate that, in general, more information does tend to reduce the probability of abuse, although this variable is not significant in the majority of the regions. The manner in which adolescents receive this information has also been considered, and it emerges that they tend to minimize the harmful consequences of alcohol abuse, with the result being that those adolescents who consider themselves to be better informed in fact have a higher probability of abusing. This would suggest that, in order to be effective, any informative campaigns should use language that adolescents can

identify with, and also reflect the present-day environment in which they live.

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