

Predictive factors of alcohol consumption in adolescents: data from 1-year follow-up prospective study

Factores predictores del consumo de alcohol en adolescentes: datos de un estudio prospectivo de 1 año de seguimiento

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Abstract

Alcohol use/abuse is a health problem in adolescents. The last Survey on use of drugs in Secondary Schoolers carried out in Spain (ESTUDES 2014-2015), reveals that 76.8% of adolescents aged 14 to 18 years consumed alcohol in the previous year and 68.2% in the last month. The aim of this study is to determine the medium-term factors associated with alcohol consumption in a sample of Spanish adolescents. The present study was carried out as a part of the Saving and Empowering Young Lives project in Europe (SEYLE) project. The final sample was composed of 708 students, assessed at two times [basal (T_0) and one year later (T_1)] [males: 51.98%, basal mean age (SD)=4.43 (0.67)]. Univariate and multivariate regression analyses were performed in order to investigate relationships between possible predictive variables found at time T_0 and alcohol consumption at time T_1 . At basal time (T_0) the prevalence of alcohol abuse was 25.56%, whereas the prevalence one year later was 49.72% (T_1). Variables that significantly predict alcohol abuse within a year are: previous alcohol abuse at T_0 ($p<0.001$), previous abuse of drugs ($p=0.011$), parents attending their sporting events ($p=0.005$), peer problems ($p=0.019$), and lack of prosocial behaviour ($p=0.043$). In the light of our results, it can be concluded that, in adolescents, externalizing disorders seem to be determining factors of medium-term alcohol consumption.

Keywords: Adolescents; Alcohol Consumption; Predictive factors; Follow-up study.

Resumen

El uso/abuso de alcohol es un problema de salud en los adolescentes. La última Encuesta sobre uso de drogas en Enseñanzas Secundarias realizada en España (ESTUDES 2014-2015), pone de manifiesto que 76,8% de los adolescentes entre 14 y 18 años consumieron alcohol en el último año y 68,2% en el último mes. El principal objetivo es determinar los factores que se asocian con el consumo de alcohol a medio plazo en una muestra de adolescentes españoles. El estudio forma parte del proyecto Saving and Empowering Young Lives in Europe (SEYLE). La muestra final estuvo compuesta por 708 estudiantes, evaluados en dos momentos temporales [basal (T_0) y al año (T_1)] [varones: 51,98%, edad media basal (DE)=4,43 (0,67)]. Se realizaron análisis de regresión univariante y multivariante, con el fin de investigar las relaciones entre posibles variables predictoras descritas en el momento temporal T_0 y el consumo de alcohol en el momento T_1 . En el momento basal (T_0) la prevalencia de abuso de alcohol fue del 25,56%, mientras que la prevalencia al año fue del 49,72% (T_1). Las variables que predicen de forma significativa el abuso de alcohol al cabo de un año son: abuso previo del alcohol en el momento T_0 ($p<0,001$), abuso previo de drogas ($p=0,011$), padres que asisten a sus competiciones deportivas ($p=0,005$), problemas de relación con compañeros ($p=0,019$) y ausencia de comportamiento prosocial ($p=0,043$). A la vista de nuestros resultados se puede concluir que, en adolescentes, los trastornos externalizantes parecen ser factores determinantes de consumo de alcohol a medio plazo.

Palabras clave: Adolescentes; Consumo de Alcohol; Factores predictores; Estudio prospectivo.

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The World Health Organization (WHO) has described the abuse of alcohol as a worldwide public health problem and has warned of the damage it causes to physical and psychological health. In 2012, around 3.3 million deaths worldwide were caused by alcohol (World Health Organization, 2014). It is also a significant among the younger population. According to the latest national survey of drug use in secondary schools (ESTUDES 2014-2015), 76.8% of adolescents aged between 14 and 18 in Spain had consumed alcohol within the previous year and 68.2% during the previous month (Plan Nacional sobre Drogas, 2016). At the European level, the data are similar, with 79% of students aged between 15 and 16 years having consumed alcohol in the previous 12 months and 57% in the previous month (Hibell et al., 2012).

There are data that reveal a link between different characteristics of the adolescent population group and the use of alcohol and other drugs. For example, high school students (Patrick, Yeomans-Maldonado & Griffin, 2016) have a higher prevalence of alcohol consumption during school years than non-students, who use marijuana more (Johnston, O'Malley, Miech, Bachman & Schulenberg, 2012; O'Malley & Johnston, 2002). However, in the long term, people who did not attend high school tend to use alcohol more and have more problems involving the use of other substances in adulthood, compared to those who did study. (Lanza & Collins, 2006; Patrick et al., 2016; White, Labouvie & Papadaratsakis, 2005).

Sex is also a factor associated with alcohol use. At younger ages (8th grade), the rate of alcohol use in the previous 30 days is slightly higher among girls (13%) than boys (12%). However, this proportion is inverted in older students (12th grade), with rates of 38 and 42% respectively, and remains so in adulthood, with higher rates of use among men than women (Johnston et al., 2012; Wilsnack et al., 2000).

Alcohol use among adolescents has furthermore been associated with behavioral and neuropsychological problems, where an association has been observed between alcohol consumption and executive function deficit that manifests itself in greater difficulty in decision making, the severity of which correlates inversely with the age when alcohol was first drunk (Deckel, Bauer & Hesselbrock, 1995; Kim, Kim & Kwon, 2001; Sobock, Abbey, Agius, Clinton & Harrison, 2000).

There are also other factors that have been associated with alcohol use in adolescents. The following have presented a negative correlation with alcohol consumption: parental supervision (Dever et al., 2012; Pilgrim, Schulenberg, O'Malley, Bachman & Johnston, 2006); religiosity (Brown, Schulenberg, Bachman, O'Malley & Johnston, 2001; Wallace et al., 2007; Wray-Lake et al., 2012); links to the community (Wray-Lake et al., 2012); levels of self-esteem (Maslowky & Schulenberg, 2013); as well as a neg-

ative attitude towards alcohol, which turns out to be one of the most powerful prevention factors against abusive consumption. Conversely, these factors correlate positively with alcohol use: externalized conflict behavior (Bachman et al., 2008; Maslowky & Schulenberg, 2013); sensation seeking and risk taking (Dever et al., 2012; Patrick et al., 2010; Pilgrim et al., 2006; Schulenberg et al., 1996); and a depressive affective state (Maslowky & Schulenberg, 2013; Patrick et al., 2010; Schulenberg et al., 1996). Exercise and sports have a complex effect: while doing exercise negatively correlates with the alcohol use during adolescence, participating in team sports correlates positively, especially among males (Dever et al., 2012; Terry-McElrath, O'Malley & Johnston, 2011).

Of all the variables studied, the one with the strongest link to using alcohol and other drugs is having friends who get drunk (Patrick & Schulenberg, 2010); and the one that most influences the prognosis is the onset age: young alcohol abusers respond worse to treatments and have worse prognoses (Gueorguieva et al., 2014).

Earlier onset of alcohol use worsens the long-term prognosis. People who later develop alcohol dependence, typically begin intensive use at an early age (Schulenberg et al., 1996; White, Johnson & Buyske, 2000). The consumption of alcohol early in adolescence, especially when it involves individuals with low socioeconomic levels, appears to be associated with more rapidly growing dependence (Ehlers, Slutske, Gilder, Lau & Wilhelmsen, 2006) and increased risk of persistent alcohol abuse (Yaogo, Fombonne, Lert & Melchior, 2015). Another negative prognostic factor, as pointed out by Jessor (1991), is that the use and abuse of alcohol does not usually occur in isolation, but tends to be associated with other problems of adolescent behavior such as the use of illicit drugs, antisocial behavior, early sexual behavior and poor academic performance.

The objective of the present study is to determine the factors associated with alcohol consumption among a sample of Spanish adolescents.

Method

A prospective longitudinal observational epidemiological study was carried out which analyzed the Spanish data of the *Saving and Empowering Young Lives in Europe* (SEYLE) project (Wasserman et al., 2012) at two points of the study: baseline (T_0) and one-year (T_1).

Participants

The sample (Spanish sub-sample) at baseline (T_0) consisted of 1026 subjects who were recruited from twelve randomly selected public schools in the Autonomous Community of the Principality of Asturias, taking into account the inclusion and exclusion criteria of the SEYLE project listed below (Bousoño et al., 2017; Wasserman et al., 2010).

To participate in the study, schools and adolescents had to meet the following inclusion criteria: the local education authority agrees to participate; the school is a non-specialized public school; there are at least forty 15-year-old students at the school; the school has students of both sexes; the school has more than two teachers for 15-year-old students; no more than 60% of students at the age of 15 are of the same sex; parents and students provide informed consent.

At baseline (T_0), 1026 adolescents were included in the study (mean age 14.52 years, standard deviation 0.702, 51.66% male and 48.34% female). Of these, 708 students (51.84% male and 48.16% female) participated in the follow-up one year after the start of the study (T_1), which corresponds to 69.01% of the baseline sample. At T_0 and T_1 , adolescents completed pencil and paper questionnaires.

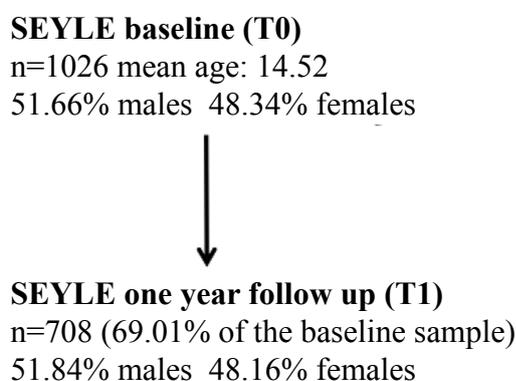


Figure 1. Flow chart of the number of students participating in each of the phases of the investigation (T_0 - T_1).

Procedure

In compliance with the rules governing research with young subjects, authorization was obtained from the juvenile prosecutor prior to the start of the study, as was the approval of the Clinical Research Ethics Committee of the Principality of Asturias. The local education authority granted permission to approach the selected schools, and the subjects of the study agreed to take part and provided informed consent, as required. A structured self-report questionnaire was given to the participants at the two different time periods (T_0 = baseline and T_1 = 1 year), each student recruited was assigned a unique code so that the follow-up could be carried out at the individual rather than merely the group level. The coding of the data protects the privacy of the study subjects, and the database was anonymous, making it impossible to identify the people involved. The key matching the anonymous codes to the study subjects was kept confidentially in an independent location which was set up for this purpose and properly secured in the Psychiatry Department at the University of Oviedo, with the principal investigator of the project in charge of the data. All aspects regarding quality control, homogeni-

zation of procedure, ethical aspects and the validity of the scales used are described in detail in the work of Carli et al. (2013).

Study assessment

Assessments was conducted during school hours and data such as age, the country of birth of the adolescent and their parents, the work situation of the parents, lifestyles, family, coexistence, mental health and suicidality were collected.

Alcohol abuse was investigated with the item (“*Throughout your life, how many times have you drunk so much alcohol that you were really drunk?*”), where ‘never’ contrasted with the other answer categories (1 or 2 times, 3 to 9 times, 10 or more times) at the two moments considered, T_0 and T_1 .

Suicidal ideation and behavior were measured by the Paykel suicide scale (PSS) (Paykel, Myers, Lindenthal & Tanner, 1974). The PSS asks the following five questions: during the last 2 weeks, (i) Have you felt that life is not worth living? (ii) Have you wished you were dead? (iii) Have you thought about taking your life even though you would not really do it? (iv) Have you reached the point where you have seriously considered taking your life or perhaps made plans about how you would go about doing it?; and (v) Have you ever tried to take your life? People answering “yes” to the third (iii) or the fourth (iv) question of the PSS were considered to have suicidal thoughts, while suicide attempts were defined by the “yes” answer to the last question (v).

For the assessment of substance use, the Global School-based Student Health Survey questionnaire, GSHS, (World Health Organization, 2015) was used, and the following cut-off points established: in terms of alcohol use, the cut-off point was considered to be consuming any amount of alcohol twice or more a week; in terms of drugs, to have used illegal drugs at least three times during one’s lifetime, and in terms of tobacco, smoking more than ten cigarettes a day. The same questionnaire was used to assess variables such as eating behaviors, protective factors, physical activity, mental health, etc. The GSHS questionnaire items were recoded to identify these areas of behavior by considering reduced sleep as sleeping 6 hours a night or less, being overweight as having a body mass index BMI above percentile 95, being underweight with a BMI below percentile 5, sedentary behavior as doing physical activity less than once a week, media use as using internet, TV and video games for reasons unrelated to school or work for 5 hours or more per day, absenteeism as skipping school at least once a week without being sick or having another legitimate excuse (Carli et al., 2014).

The Beck inventory (BDI-II) was used to evaluate depressive symptoms (Beck, Steer, Ball & Ranieri, 1996), and anyone with a score equal to or greater than 20 was considered to be at risk of depression. The BDI-II is normally

a 21-item questionnaire used to measure depressive symptoms, but for the present study a modified version was used from which the item “loss of libido” was removed since it was considered an inappropriate question for the adolescent population. Evidence shows that the omission of this question does not affect the reliability or validity of the instrument (Byrne, Stewart & Lee, 2004).

To assess psychopathology, the Strengths and Difficulties Questionnaire was used (SDQ) (Goodman, Meltzer & Bailey, 2003), which measures emotional symptoms, behavior problems, hyperactivity/lack of attention, relationship problems among couples and pro-social behavior. The chosen cut-off points were: a score greater than or equal to 7 for emotional symptoms, a score greater than or equal to 5 for behavioral problems and a score greater than or equal to 7 for hyperactivity. In the case of problems with peers, the cut-off point was set at a score greater than or equal to 6, while the lack of prosocial behavior was defined with a score less than or equal to 4 (Carli et al., 2013).

For the assessment of anxiety, the Zung Anxiety Questionnaire (Zung, 1971) was used, consisting of 20 items. Each has a response scale from 1 to 4 points, providing total score range from 20 to 80 points, with the cut-off point being 30 points or more.

Statistical analysis

Descriptive statistics were used to determine the prevalence of alcohol consumption at the different time points, as well as the frequencies for the different psychosocial variables (e.g., parental employment, caring parents, suicidal behavior, etc.). Means and standard deviations of the scale variables were also calculated (e.g., SDQ scale dimensions, BDI depression scale score, Zung anxiety scale, etc.).

Univariate and multivariate regression analyses were carried out in order to investigate the relationships between the predictors previously described at T_0 and alcohol consumption at T_1 . Stepwise methodology was used for the multiple regression analysis, minimizing the value of the Bayesian information criterion (BIC). All statistical analyses were performed with version 24 of the SPSS software. An alpha significance level of 5% was chosen.

Results

The following results correspond to a cohort of 708 students, of which 367 were male (51.98%) and 339 female (48.02%), and who were assessed at the two moments of the study. At baseline (T_0), the mean age was 14.43 years with a standard deviation (SD) of 0.67 and an age range between 13 and 17. The prevalence of alcohol abuse at T_0 was 25.56%, rising to 49.72% at one year (T_1). Table 1 shows the proportion of students with alcohol abuse at the time points studied.

The results of the separate regressions of each of the characteristics studied at T_0 in relation to alcohol abuse at T_1 are presented in Table 2. This regression analysis, carried out variable by variable for all the independent variables considered, revealed significant results for the following: alcohol abuse and drug abuse in T_0 , behavior problems (SDQ questionnaire), BDI depression scale and suicidal behavior. The results of the multiple regression analysis are presented in Table 3. After applying the stepwise regression procedure, the following variables turned out to be significant predictors of alcohol abuse in T_1 : alcohol abuse at T_0 ($b = 0.34$, $p < 0.001$), drug abuse at T_0 ($b = 0.106$, $p = 0.011$), and parents who watched a sports performance or competition at T_0 ($b = 0.113$, $p = 0.005$), SDQ peer relationship problems at T_0 ($b = 0.092$, $p = 0.019$), prosocial behavior in T_0 ($b = -0.079$, $p = 0.043$). The adjusted R^2 of the final model was 0.287 with an F value for the model of 2129.78, which allows us to reject the null hypothesis that in this regression model all the coefficients of the independent variables are equal to zero. The other variables considered were not included in the final prediction model of alcohol abuse at T_1 .

Table 1. Alcohol abuse (baseline and one year)

Baseline	1 year	N	(%)
no	no	356	50,28%
no	yes	171	24,16%
yes	yes	181	25,56%

Table 2. Models of separate regressions of alcohol abuse after one year for each of the demographic, social and psychological factors considered at T_0 .

Demographic, social and psychological factors	Alcohol abuse at T_1		
	T_0	P	R ²
	β (IC 95%)		
Alcohol abuse	0.186 (0.163; 0.203)	<0.001	0.345
Drug abuse	0.278 (0.189; 0.367)	<0.001	0.076
<i>Household composition</i>			
Students live with a biological parent or relative	-0.060 (-0.160; 0.400)	0.109	0.04
<i>Parental involvement</i>			
Parents check you have done your homework	-0.087 (-0.177 ; 0.003)	0.066	0.029
Parents understand your problems or worries	0.014 (-0.006; 0.034)	0.766	0.054
Parents know what you really do in your free time	-0.066 (-0.616; 0.484)	0.172	0.073
Parents help you make decisions	-0.059 (-0.509; 0.391)	0.201	0.019
Parents try to find time to talk to you about things that happen to you	-0.051 (-0.147; 0.045)	0.263	0.028
Parents come to see you when you do something special, like play in a match or perform	0.005 (-0.325; 0.335)	0.917	0.01
Parents listen to your opinions or to what you say	-0.043 (-0.721; 0.635)	0.359	0.02
<i>Parental unemployment</i>			
Parents or tutors of the student are unemployed	0.059 (-0.513; 0.631)	0.141	0.003
<i>Strengths and difficulties questionnaire (SDQ)</i>			
Emotional symptoms (SDQ)	0.088 (-0.003; 0.179)	0.098	0.017
Conduct problems (SDQ)	0.141 (0.131; 0.151)	0.002	0.077
Hyperactivity / attention deficit (SDQ)	-0.027 (-0.116; 0.062)	0.557	0.014
Peer problems (SDQ)	0.041 (-0.205; 0.287)	0.357	0.001
Prosocial behavior (SDQ)	-0.051 (-0.113; 0.011)	0.313	0.024
Depression (BDI scale)	0.193 (0.161; 0.225)	<0.001	0.097
Anxiety(Zung scale)	-0.001 (0.693; 0.691)	0.972	0.071
Suicidal behavior	0.12 (0.114; 0.126)	0.04	0.057

Tabla 3. *Multiple regression model of the alcohol abuse variable after one year for each of the demographic, social and psychological factors considered at T₀.*

Factores demográficos, sociales y psicológicos	Alcohol abuse at T ₁	
	T ₀	
	β (CI 95%)	p
Alcohol abuse	0.340 (0.16; 0.52)	<0.001
Drug abuse	0.106 (0.021;0.191)	0.011
<i>Household composition</i>		
Students live with a biological parent or relative	-0.030 (-0.260; 0.200)	0.446
<i>Parental involvement</i>		
Parents check you have done your homework	-0.018 (-0.208; 0.172)	0.663
Parents understand your problems or worries	0.051 (-0.009; 0.111)	0.25
Parents know what you really do in your free time	0.039 (-0.511; 0.589)	0.444
Parents help you make decisions	0.043 (-0.327; 0.413)	0.323
Parents try to find time to talk to you about things that happen to you	-0.002 (-0.085; 0.089)	0.954
Parents come to see you when you do something special, like play in a match or perform	0.113 (0.015; 0.211)	0.005
Parents listen to your opinions or to what you say	0.048 (-0.630; 0.726)	0.265
<i>Parental unemployment</i>		
Parents or tutors of the student are unemployed	0 (-0.472; 0.472)	0.995
<i>Strengths and difficulties questionnaire (SDQ)</i>		
Emotional symptoms (SDQ)	0.046 (-0.864; 0.956)	0.372
Conduct problems (SDQ)	0.059 (-0.141; 0.259)	0.155
Hyperactivity / attention deficit (SDQ)	-0.007 (-0.587; 0.573)	0.857
Peer problems (SDQ)	0.092 (0.064; 0.120)	0.019
Prosocial behavior (SDQ)	-0.079 (-0.135; -0.023)	0.043
Depression (BDI scale)	0.088 (-0.001; 0.177)	0.058
Anxiety (Zung scale)	0.042 (-0.009; 0.093)	0.315
Suicidal behavior	0.029 (-0.008; 0.066)	0.478

Discussion

These results are in general similar to those brought to light by other authors researching the adolescent population, although with some differences worth highlighting. The alcohol abuse rate obtained in the baseline assessment of the present study (25.56%) is higher than the rates of alcohol consumption in European adolescents, which range from 6% to 23% (Green, Leyland, Sweeting & Benzeval, 2013; Richter, Kuntsche, de Looze & Pförtner, 2013), and triples the rates obtained by two previous studies carried out with similar methodology to ours. In the first, performed on a sample with an average age of 14.9 years (Rüütel et al., 2014), alcohol abuse (consuming alcohol 2 or more times a week) stood at 8.2%, and in the second (Carli et al., 2014), the rates of alcohol abuse in adolescents aged 14 and 15, were 5.2% and 7.3% respectively. In our case, the significant increase in the rate of consumption observed one year after the baseline observation (49.72%) may mean that a very relevant period has been identified for the beginning of alcohol use in the population studied.

It is understood that individual patterns of alcohol consumption are influenced by the neurological, cognitive and social changes that typically occur in adolescence and, furthermore, that alcohol consumption influences the emergence of neurological damage and social deterioration during adolescence (Brown et al., 2008). Nevertheless, the high frequency of alcohol consumption among young people has led to the phenomenon being trivialized, despite the recurrence of data from Spain (ESTUDES 2014-2015), Europe and the USA, which show that at age 16 almost two thirds of young people have tried alcohol at least once in their lives, and more than two fifths have reported having been drunk at least once. At 18, more than three-quarters of young people have tried alcohol at least once in their lives and more than three-fifths have reported being drunk at least once (Johnston, Bachman & Schulenberg, 2012). Our data confirm this phenomenon while adding a further negative element: alcohol use starts at a very early age (at T_0 , at an average age of 14.4 years, around a quarter of the adolescents had already abused alcohol, and among those who had not yet started drinking at T_0 , a significant percentage used alcohol during the year of the study's observation period).

The notably wide variability between different countries in the rate of alcohol use among adolescents could be due to socioeconomic, educational, legal and cultural factors (Kuntsche et al., 2014). It should be noted that the Spanish population involved in this study belongs to a single autonomous community (Asturias), whose sociodemographic characteristics (a declining and aging population, high rate of unemployment and economic impoverishment), may explain greater alcohol use as an escape route for adolescents in poor social circumstances with negative future perspectives.

In any case, the detection of a high rate of alcohol use at such an early age is very important fact which must not be ignored, since early alcohol onset is associated with an increased risk of developing an alcohol use disorder (DeWit, Adlaf, Offord & Ogborne, 2000; Pitkänen, Lyyra & Pulkkinen, 2005).

A key element in the contact minors have with alcohol has been shown to be the family situation. A study conducted in Spain shows that increased alcohol use within the family environment, especially by siblings (Golpe, Isorna, Barreiro, Braña & Rial, 2017), is a possible precedent. Other recent research reveals how teenagers' patterns of alcohol use are linked to their family structure. Living in a family with biological parents, for example, is a protective factor, in contrast to single-parent families or families with a biological parent and a step-parent (Rüütel et al., 2014).

Our work reveals data that seem counterintuitive. There is a correlation between the presence of parents at their children's sports activities and adolescent alcohol use at T_1 . In principle, parents accompanying their children to sports activities is a form of parental monitoring, and monitoring represents a protective factor against alcohol and drug abuse (Fletcher, Steinberg & Williams-Wheeler, 2004; Tilton-Weaver, Burk, Kerr & Stattin, 2013) by delaying onset and reducing the risk of misuse (DeVore & Ginsburg, 2005). Conversely, alcohol use tends to increase with parental separation and a decrease in parental monitoring (Barnes, Reifman, Farrell & Dintcheff, 2000).

This paradox may in part be explained by the bias inherent in age, since alcohol consumption increases with age (Johnston, O'Malley, Miech, Bachman & Schulenberg, 2016). However, the association between sporting events and alcohol use could be due to the fact that victory celebrations involving alcohol are frequent; or because participation in competitions sometimes entails traveling away from the family home, which may increase the likelihood of alcohol use (Tahiraj et al., 2016). In any case, the link between alcohol use and sports among young people is not clear, with some studies finding that hazardous drinking is more frequent in boys who have spent more time participating in sports (OR = 1.49) (Sajber, Tahiraj, Zenic, Peric & Sekulic, 2016), and others showing that sport can have a positive effect on young people, resulting in less alcohol use (Lopez, Rodriguez, Garcia & Perez, 2016).

Disruptive behaviors among young people are associated with alcohol or drug use disorders. A model for the development of disorders has been described in which parental problems and experiences of abuse or abandonment during childhood are combined with problems at school and with peers during adolescence, thereby increasing the risk of substance abuse at the young adult stage (Abrantes, Brown & Tomlinson, 2003; Bifulco, Schimmenti, Jacobs, Bunn & Rusu, 2014). A study recently conducted in Spain has found a statistically significant association between vic-

timization and the use of psychoactive substances (Caravaca, Navarro-Zaragoza, Luna, Falcón & Luna, 2017).

There are studies showing that children and adolescents who experience rejection by their peer group because of their disturbed behavior tend to relate to one another (Coie, Terry, Lenox, Lochman & Hyman, 1995; Laird, Jordan, Dodge, Pettit & Bates, 2001) and this association with peer groups with behavioral disturbances mediates the association between depressive symptoms experienced at 14 and high-risk alcohol use at 16 years of age (Pesola et al., 2015). It has also been observed that the early use of alcohol is associated with antisocial behavior (Brown, 1993; Hill, White, Chung, Hawkins & Catalano, 2000), and it is believed that the use of alcohol in adolescence increases the probability of other problematic behaviors given that exposure to alcohol affects the course of adolescent development (Kandel et al., 1999). For other authors, however, (Vanyukov et al., 2003), comorbidity is the product of a general predisposition to contravene social norms. According to this theory, the use of alcohol and the appearance of other problematic behaviors is a result of character structure. A recent study provides empirical evidence to link the use of alcohol and other drugs to problematic Internet use among adolescents (Golpe, Gómez, Braña, Varela & Rial, 2017).

In studies conducted with community samples of adolescents, the presence of alcohol or substance use multiplies the rates of comorbid mental health disorders by three compared to non-consumers (Kandel et al., 1999). It is known that alcohol use tends to increase during late adolescence (McCambridge, McAlaney & Rowe, 2011) and that the problems related to alcohol at this stage correlate strongly with greater morbidity and mortality (Hingson, Zha & Weitzman, 2009).

There appears to be a bidirectional relationship between depression and alcohol use in adolescence. Early use of alcohol has been associated with depression (Brook, Brook, Zhang, Cohen & Whiteman, 2002; Wells, Horwood & Fergusson, 2004), and the depression experienced in adolescence has been identified as a risk factor for greater alcohol use at this age (Marmorstein, Iacono & Malone, 2010; Saraceno, Heron, Munafo, Craddock & Van den Bree, 2012). A recent study by Pesola et al. (2015) found that the presence of depressive symptoms at age 14 is positively associated with hazardous drinking at 19 years of age.

Adolescent girls are at greater risk than boys of being victims of abuse (Champion et al., 2004) and of suffering from depression or anxiety (Poulin, Hand, Boudreau & Santor, 2005). While in boys this is more likely to produce externalizing behaviors such as behavior disorders and impulsivity (Caspi, Moffitt, Newman & Silva, 1996), in girls this could result in alcohol use. Structured psychological interventions to treat early behavior problems have been effective; treated patients show less favorable attitudes toward drugs, lower intention to use, less frequent use of to-

bacco and lower alcohol use intensity (Romero, Rodríguez, Villar & Gómez-Fraguela, 2016).

The present study has some limitations, is part of a Europe-wide study, and the sample size does not allow relationships between infrequent variables, such as drug use, to be established, or for an age group segregated study to be conducted.

Conclusions

Our study confirms the widespread use of alcohol among the adolescent population. In addition, it shows that variables such as previous alcohol and/or drug abuse, relationship problems with classmates, and the absence of prosocial behavior are predictors of alcohol abuse in the medium term. Moreover, there seems to be a clearly established link between alcohol consumption and affective disorders, although our results do not allow us to infer causality. We believe that all these factors should be taken into account when designing and implementing preventive strategies.

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Conflict of interest

The authors declare no conflict of interest.

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