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DELEGACIÓN DEL GOBIERNO PARA EL PLAN NACIONAL SOBRE DROGAS

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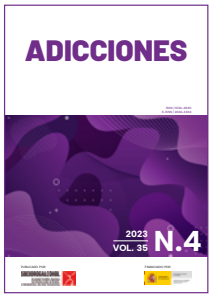

EDITORIAL

Is adolescent use of tobacco, alcohol and cannabis decreasing?

¿Está disminuyendo el consumo de tabaco, alcohol y cannabis por los adolescentes?

Begoña Brime*, Joan R Villalbí*.

* Government Delegation for the National Plan on Drugs, Ministry of Health, Spain.

Adolescence is a life stage characterized by experimentation. As part of their maturation process, adolescents develop various risk behaviours throughout this period (Kahn & Graham, 2019). Some of these may be considered healthy behaviours, serving to develop autonomy, practise decision-making, and build one's own identity, and they are socially acceptable and constructive; others, however, are problematic. These include behaviours involving illegality or affecting personal safety, such as experimenting with substances with addictive potential. For those of us working in the field of addictions, the use of psychoactive substances by adolescents is an issue of great importance. Although isolated episodes of use should be distinguished from substance use disorders (Sultan et al., 2023), the early use of these substances is not trivial, and in addition to their short-term effects, there is a greater probability that addiction may develop (Volkow et al., 2016). Avoiding this, or at least delaying and reducing it, is therefore of great benefit for public health and forms the context for both environmental and universal prevention efforts (Becoña-Iglesias, 2021; Burkhart, 2022; United Nations Office on Drugs and Crime and the World Health Organization, 2018).

In several developed countries recently, a decrease in adolescent use of the most widespread addictive substances (notably tobacco, alcohol and cannabis), as well as other risk behaviours, has been documented (Ball et al., 2023). The records derived from representative surveys in this population show a consistent downward trend in the USA, Australia, New Zealand, England, the Netherlands, and various European Union countries participating in the ESPAD survey (Ball et al., 2023; ESPAD Group, 2020).

A look at the situation in Spain reveals similar trends, documented in data from the ESTUDES survey, which has been carried out every two years since 1994 (Spanish Observatory on Drugs and Addictions, 2022). The still unpublished 2023 survey results have been incorporated. As can be seen in Figure 1, both tobacco and cannabis use among adolescents, on the increase at the beginning of the series, seem to be subject to a downward trend after peaking in 2004, albeit with some occasional fluctuations (perhaps more marked by the effects of the pandemic). Figure

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2 shows some variables related to adolescent alcohol use (limited to the period 2008-23 since some indicators of risky drinking were not collected in the survey's early years). It can be seen how alcohol use appears to be falling, especially those drinking patterns that raise the greatest concern (daily drinking, binge drinking, and participation in *botellón*-style drinking sessions in public spaces) which appear to have decreased since 2010-12. These figures do not break the data down by sex, but their distribution shows similar patterns. Other systematic sources of representative data have documented similar trends in local areas (del Pino & Astray, 2019; Santamariña-Rubio et al., 2017) or in Spain as a whole (Leal-López et al., 2019; Leal-López et al., 2020, 2021). It therefore seems that Spain may be participating in this trend. This would be very positive: a reduction in the early use of substances with addictive potential can contribute to reducing later substance use disorders (Marel et al., 2019).

The reasons behind this dynamic are the subject of international debate and controversy (Ball et al., 2023). The ESTUDES surveys show that the risk perception of heavy drinking has increased over these years, approaching the risk perception of habitual cannabis and tobacco use. They also show that the perception of ease of availability of tobacco and alcohol has not changed (despite the ban on sales to minors) and is over 85%. On the other hand, that of cannabis has decreased somewhat (from 72% in 2004 to 61% in 2021), with a much greater decrease in that of other less prevalently used substances (such as cocaine, ecstasy, amphetamines, or sedative-hypnotics) (Spanish Observatory on Drugs and Addictions, 2022). It may be that the most important factor is something highlighted by the promoters of the Icelandic program in their assessment as a key element of prevention: the decrease in leisure time with peers and without family supervision (Kristjansson et al., 2010), an aspect also suggested by other studies (Kreski et al., 2022). The ESTUDES surveys document how substance use by adolescents steadily increases depending on how often and how long they go out at night. Some data suggests that these outings have decreased in recent years: the proportion of those who say that they go out less than once a month rose from 11% in 2008 to 18% in 2021 (Spanish Observatory on Drugs and Addictions, 2022). It is also relevant that the proportion reporting that their mothers disapprove of smoking and drinking has increased, and that the perception of consumption by their peers has decreased significantly. It should also be noted that failure at school has decreased: the number of students repeating a year in secondary school has fallen from 37% in 2008 to 21% in 2021.

Another question worth discussing is why this improvement is not widely perceived in our society. Beyond the predisposition of the media to prioritize negative over positive information, we must remember that this is a well-known phenomenon in modern societies. This reality is expertly described by Hans Rosling, who shows how citizens often ignore the progress made in the face of many major problems, and how this can lead to a fatalistic and negative attitude towards proposals for action (Rosling et al., 2018). Conversely, making progress visible reinforces the motivation to continue improving.

Figure 1
Prevalence of tobacco and cannabis use at some time in the last month and daily in secondary school students aged 14-18 in the ESTUDES survey. Spain, 1994-2023

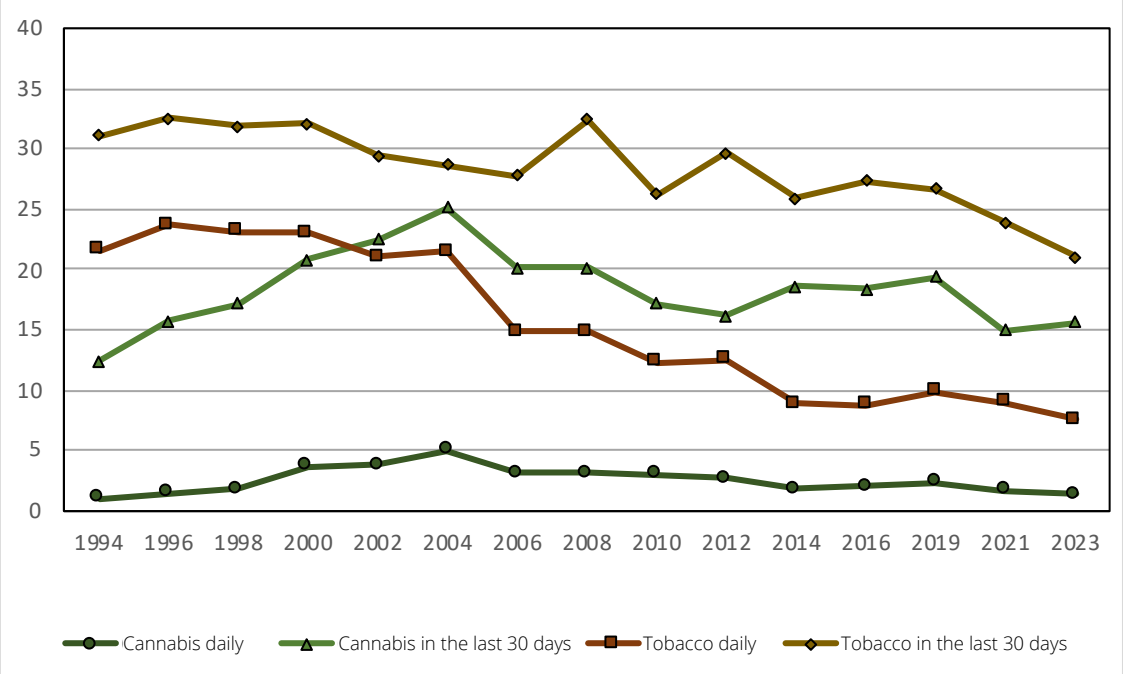
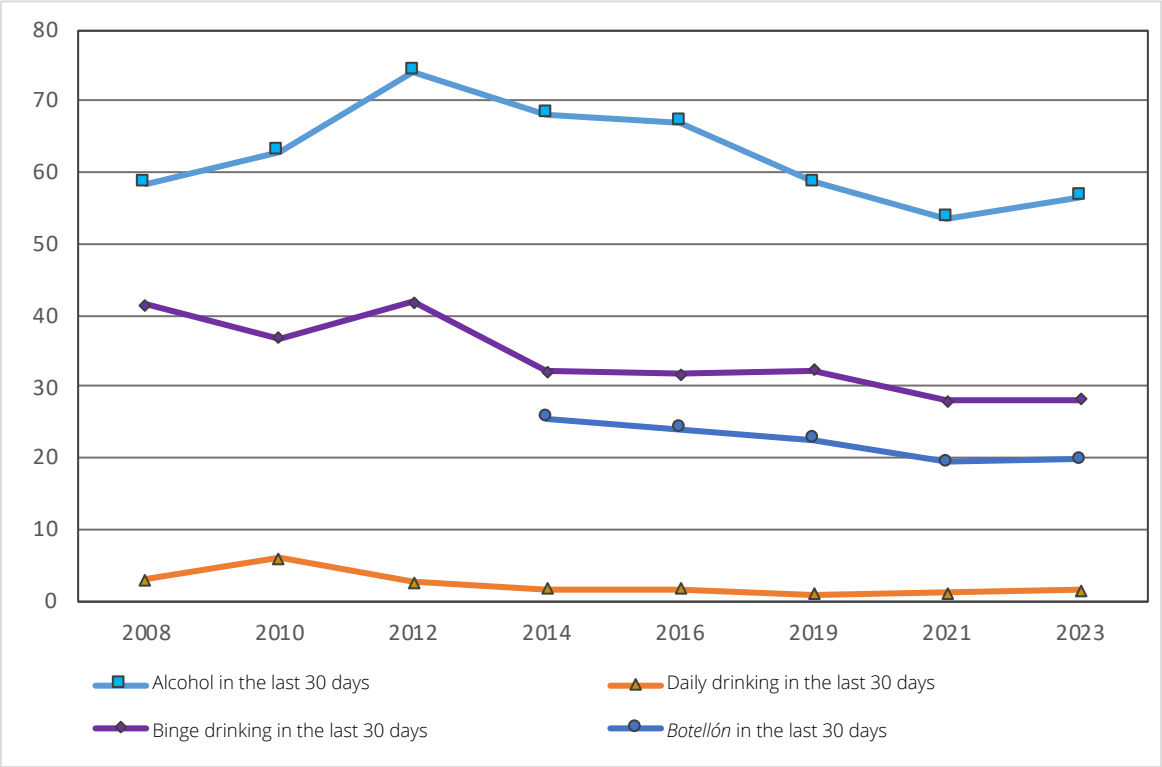


Figure 2
Prevalence of alcohol use, binge drinking, and participation in public-space drinking sessions over the last month among secondary school students aged 14-18 in the ESTUDES survey. Spain, 2008-23



In this context, we believe that professionals, organizations and institutions committed to the prevention of addictions and the damage they cause must maintain efforts to understand where we are now, aware that the situation is somewhat better than years ago. To continue improving, science and data-driven prevention efforts should surely be reinforced, as detailed in the portal of good practices recently developed with support from the DGPNSD (http://www.buenaspracticasadicciones.es/) or the EMCDDA good practices portal (https://www.emcdda.europa.eu/best-practice_es). Both include prevention programs of proven value which should find wider application and achieve greater coverage. It would also be desirable that regulations aimed at reducing the availability and accessibility of addictive substances are strengthened, thus reinforcing environmental prevention. At the same time, we must maintain the surveillance and monitoring systems we have in place, and remain alert to potential emerging problems.

Acknowledgments

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Conflict of interests

The authors declare no conflicts of interest.

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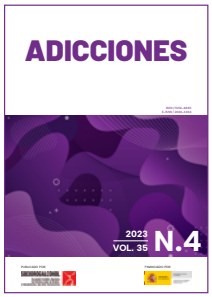

ORIGINAL

Gambling characteristics in Galicia: A Public Health problem

Caracterización del juego de azar en Galicia: Un problema de Salud Pública

Julia Rey-Brandariz**, Mónica Pérez-Ríos**, Maria Isolina Santiago-Pérez*, María Lorenzo*, Alberto Malvar*, Xurxo Hervada*.

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Abstract

Due to the increase in gambling, gambling disorders have become a major social problem of importance for public health, affecting both adults and adolescents. The main objectives of this study were to assess the prevalence of the Galician population who spent money on gambling in the last year and the prevalence of people with, or at risk of, gambling disorder. Data was obtained from a cross-sectional survey carried out in 2017 by the Galician Information System on Risk Behaviors (SICRI). The SICRI conducts annual telephone surveys of Galician residents who were at least 16 years of age, with the sample equidistributed over a 12-month period. A total of 7,841 participants were selected using stratified random sampling. In order to estimate the prevalence of gambling disorder or at-risk gambling, The South Oaks Gambling Screen (SOGS) questionnaire by Lesieur and Blume was applied. The prevalence of gambling and having or being at risk of gambling disorder was estimated and regression models were adjusted to identify variables associated with gambling disorder or being at risk. Of the Galician population aged 16 years and older, 58.1% (95% CI: 57.0-59.2) spent money on gambling in the 12 months previous to this study, with the highest prevalence of gambling found in men (64.6% vs. 52.2%) in all age groups. The prevalence of gambling disorder or at-risk gambling at the population level is 1.6% (95% CI 1.3-1.9), and is higher among men and younger gamblers. The prevalence obtained signals to gambling as a major public health concern, with young males being at greater risk of developing a gambling problem.

Keywords: gambling, prevalence, adult, behaviour, addictive

Resumen

Debido a la expansión de los juegos de azar, los trastornos asociados al juego se convierten en un gran problema social con una alta relevancia para la Salud Pública, afectando tanto a adultos como a adolescentes. Los principales objetivos de este estudio fueron conocer la prevalencia de gallegos que gastaron dinero en juegos de azar en el último año y de jugadores con un trastorno de juego o de riesgo. Los datos se obtuvieron del estudio transversal realizado en 2017 por el Sistema de Información sobre Conductas de Riesgo (SICRI). El SICRI se basa en la realización anual de encuestas telefónicas a la población gallega residente que tiene al menos 16 años de edad con la muestra equidistribuida en 12 meses. Un total de 7.841 participantes fueron seleccionados mediante un muestreo aleatorio estratificado. Con el objetivo de estimar la prevalencia de trastorno de juego o de riesgo se utilizó el cuestionario South Oaks Gambling Screen (SOGS) de Lesieur y Blume. Se estimó la prevalencia de juego y jugadores con un trastorno de juego o juego de riesgo y se ajustaron modelos de regresión para identificar las variables asociadas al trastorno de juego o juego de riesgo. De la población gallega de 16 años en adelante, el 58,1% (IC 95%: 57,0-59,2) gastó dinero en juegos de azar en los 12 meses previos a la realización del estudio, siendo la prevalencia de jugadores más alta en los hombres (64,6% vs. 52,2%) en todos los grupos de edad. La prevalencia de trastorno de juego o juego de riesgo en la población es del 1,6% (IC 95%: 1,3-1,9), siendo más alta entre los hombres y en los jugadores más jóvenes. Las prevalencias obtenidas señalan al juego como un importante problema de Salud Pública, siendo los varones jóvenes los que tienen un mayor riesgo de desarrollar un problema asociado al juego.

Palabras clave: juego de azar, prevalencia, adulto, conducta adictiva

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Playing games of chance is a legal and socially accepted activity. Recent data show that the majority of adults have played games of chance at some point in their lives and that there are more gamblers than non-gamblers at the population level. The practice of gambling varies between populations, with the highest prevalences observed in European countries and the United States. Thus, in 2010 in the United Kingdom, 73.0% of the population aged 16 and over declared having gambled in the previous year, while in 2011-2013, among the population aged 18 and over in the United States, this percentage was estimated at 76.9%, and in North Korea in the same age group in 2011 it was 41.8% (Draft & Griffiths, 2016). Although most adult gamblers do not develop gambling-related disorders (Potenza, Kosten & Rounsaville, 2001), it leads to an addictive disorder in some people that causes health, social, work, or economic problems and high suicide rates (Nautiyal, Okuda, Hen & Blanco, 2017). The worldwide prevalence of gamblers with gambling-related problems, varied from 0.1% to 5.8% in the last year, with Oceania the continent having the lowest prevalences and North America the highest. Being male, young, having a low educational level or low income are variables associated with gambling problems in different studies (Calado et al., 2016).

The development of information and communication technologies (ICT) is causing a revolution in games of chance through the emergence of online gambling, which considerably increases the accessibility of games of chance around the world. After the publication of the Royal Decree of 1977 (Real Decreto-Ley 16/1977, February 25th, regulating the criminal, administrative and fiscal aspects of games of chance and betting), no substantial changes were made in Spanish legislation until Law 13/2011 (Ley 13/2011, May 27th, regulating gambling), which legalised online gambling. This type of gambling is now a growth industry which, in economic terms, is estimated to account for a third of the gambling business in Spain; of the €41,826.8 million spent on gambling in 2017, 32.0% was spent online (Clotas, Bartroli, Caballé, Pasarín & Villalbí, 2020). In Spain, online gambling users are mostly men (83.3%) and under 46 years of age (87.5%) (Dirección General de Ordenación del Juego, 2018). In recent years, due to the expansion of online gambling, gambling disorders have become a problem from a social point of view and of great relevance to public health (Abbott, 2020).

In Spain, 75.7% of the population aged 18 and over declared having spent money on games of chance (Dirección General de Ordenación del Juego, 2015) in 2015, and in 2017 this percentage was 60.2% in the population aged between 15 and 64 years (Observatorio Español de las Drogas y las Adicciones y Delegación del Gobierno para el Plan Nacional sobre Drogas, 2019). In 1980, pathological gambling was formally classified as a mental disorder by the American Psychiatric Association (1980), and in the latest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) (American Psychiatric Association, 2013), it is listed as a disorder of an addictive nature, included in the chapter on "Substance-related disorders and addictive disorders." Pathological gambling is a persistent and maladaptive gambling behaviour that generates clinically significant distress (American Psychiatric Association, 2013), affecting both adults and adolescents with a prevalence in the latter at times greater than that of adults (Volberg , Gupta, Griffiths, Olason & Delfabbro, 2010). In 2015, 0.3% of the Spanish population aged 18 years and over had a pathological gambling disorder (Directorate General for Gambling Regulation, 2015) and among the population aged 15 to 64, this percentage was estimated at 0.5% in 2017 (Observatorio Español de las Drogas y las Adicciones et al., 2019).

Given the need for representative data in relation to gambling in Galicia, the objectives of this study were: 1) to ascertain the prevalence of Galicians spending money on gambling in the last year, 2) to ascertain the types of games most used and their frequency of use, 3) to describe the gamblers, 4) to reveal the prevalence of gamblers with or at risk of a gambling disorder, and 5) characterize gamblers with, or at risk of, gambling disorder.

Methods

The Information System on Risk Behaviors (SICRI) was established in 2005. It focuses on carrying out cross-sectional studies to obtain information on an annual basis among the population aged 16 and over residing in Galicia by means of telephone surveys using a CATI system (Computed-Assisted Telephone Interview).

The survey carried out in 2017 (SICRI-2017) was designed to guarantee the representativeness of the population by sex and in four age groups: 16-24, 25-44, 45-64 and 65 years and older. Stratified random sampling was carried out using the health insurance card database as a sampling frame; this includes both landlines and mobile phones of all Galicians who have had some contact with the health system and covers approximately 97.0 % of the population resident in Galicia. The fieldwork was carried out between January and December 2017, with the sample equidistributed by months and an average of 650 surveys carried out monthly.

Specific questions were included in the SICRI-2017 questionnaire that made it possible to estimate the prevalence of gambling and those with gambling disorders or at-risk gambling. The practice of gambling was determined by an affirmative answer to the question "Thinking about the last 12 months, did you spend money on games such as lottery, slot machines, Internet gambling ...?". Those answering yes were asked about the types of games they had spent money on, with five categories of non-exclusi-

ve answers: lottery games (lotteries, pools, draws), Internet gambling, casinos/bingo halls, slot machines, and other games. In addition, for each of the response options, they were asked about the frequency with which they gambled with 4 response options: every day, every or almost every week, a few times a month and a few times a year (Consellería de Sanidade, 2018).

People reporting playing games of chance in the 12 months prior to the interview answered 10 questions with the aim of estimating the prevalence of gamblers with gambling disorders or at-risk gambling. These questions form part of the gambling addiction section of the South Oaks Gambling Screen (SOGS) questionnaire by Lesieur and Blume (1987), adapted to Spanish (Echeburúa, Martín-Baez, Fernández-Montalvo & Páez, 1994). Questions from the debt section were not included. The total questionnaire score ranges from 0 to 10 points. To identify a gambling addiction problem, the cut-off point proposed in the validation of the SOGS questionnaire in Spain was used; gamblers scoring 4 points or more are classified as having a gambling disorder and those with 2 or 3 points are at-risk gamblers.

The information thus obtained was used to calculate the following prevalences, globally, by sex, and by age group (16-24, 25-44, 45-64 and 65 years and over): the percentage of people spending money on games of chance in the last year, globally and for each type of game, the percentage of people spending money on the lottery every week, a few times a month, and a few times a year, and the prevalence of people with a gambling disorder or at-risk gambling, those scoring 2 points or more on the SOGS.

To characterise those with gambling disorder or at-risk gambling, a logistic regression model was adjusted which initially included all the variables that were significant in a previous bivariate analysis, with $p < 0.1$. In the final model, the variables were maintained with $p < 0.05$. Adjusted odds ratios (OR) were calculated from this model. The following sociodemographic variables were assessed: sex, age group (16-24, 25-44, 45-64, 65 and over), country of birth (Spain, other country), area of residence (rural, semi-urban, urban), employment situation at the time of the survey (working, unemployed, housework, pensioner, student or other situation), level of education in three categories (basic - primary education or below, intermediate - secondary education, higher - university), and whether living with or without a partner. Self-perceived state of health at the time of the survey was also assessed (very good, good, normal, bad and very bad). Behaviour-related variables were analysed: tobacco and cannabis use (smoker or non-smoker of either at the time of the survey), alcohol use (AUDIT questionnaire, with a score ≥ 8 as indicative of risky or problematic drinking, 7 in women and in those aged over 64 years), use of instant messaging applications, social networks and virtual reality games for more than two hours a day, playing games of chance other than the lottery, playing the lottery every week or problematic Internet use (PIU), defined as starting with a score of ≥ 25 on the Internet-Related Experiences Questionnaire (CERI). The prevalences and adjusted ORs are presented with 95% confidence intervals (95% CI). The analysis was carried out with the weighted sample according to the sample design, and Stata v14.2 was used for the calculations.

This study was implemented following good practice guidelines and the Declaration of Helsinki, with express verbal consent requested and obtained from surveyed individuals.

Results

In SICRI-2017, 7,841 people over 15 years of age were interviewed, with a response rate of 78%.

Of the Galician population aged 16 years and over, 58.1% (95% CI: 57.0-59.2) spent money on games of chance in the 12 months prior to the study. The prevalence of gambling increased with age, reaching a maximum in the 45-64 age group, both in men (73.1%) and women (62.8%) and decreasing thereafter (Figure 1). The prevalence of gambling was higher in men, both globally (64.6% vs. 52.2%) and by age group, although the differences were greater in the extreme age groups (16-24 and ≥75), where the gap between the two exceeded 20 percentage points (Figure 1).

In terms of the type of gambling on which Galicians spent money in the last 12 months, 97.9% (95% CI: 97.5-98.2) declared spending on lottery, pools, draws and similar, followed by online gambling with a prevalence of 2.1% (95% CI: 1.7-2.4) (Table 1).

When assessing the frequency of gambling among Galicians who reported doing so, a few times during the year was the most frequent response, regardless of sex and age group. Among the Galician population playing the lottery, pools or draws, 33.9% (95% CI: 32.4-35.4) did so on a weekly basis, with the highest prevalence in men (41.8 % vs. 25.2%). Depending on the age group, the lowest weekly gambling frequency was observed among those aged between 16 and 24 years [16.2% (95% CI: 12.3-20.2)] and the highest among those in the 45-64 group [37.9% (95% CI: 35.3-40.4)] (Figure 2).

Online gambling was practised by 1.2% (95% CI: 1.0-1.4) of Galicians aged 16 and over in the last year. The prevalence varied both by sex and by age group, being higher in men (2.4% vs. 0.1%) and decreasing with age (Table 2). The prevalence of online gambling reached 6.3% (95% CI: 5.2-7.4) among Galicians aged 16 to 24 years compared to 0.2% (95% CI: 0.1-0.3) in the population aged 45 and over. Of gamblers, 2.1% (95% CI: 1.7-2.4) reported placing online bets, with the prevalence reaching a maximum of 22.8% (95% CI: 19.2-26.5) in younger gamblers.

Figure 1
Percentage of the population aged 16 and over that spent money on gambling in the last 12 months, by sex and age group, with 95% confidence interval (95% CI). Galicia, SICRI-2017

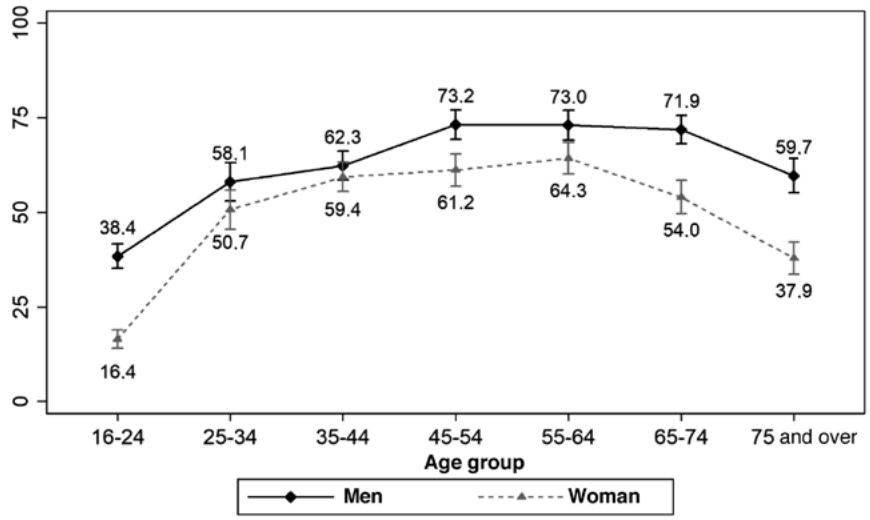


Table 1
Percentage of people 16 years and older who spent money on gambling in the last 12 months, by type of game. Data for the entire population, gamblers and gamblers with gambling disorder or at-risk gambling, with 95% confidence interval (95% CI). Galicia, SICRI-2017

Game type	In the entire population		In the gamblers		In gamblers with gambling disorder or at-risk gambling	
	%	CI95%	%	CI95%	%	CI95%
Lottery, pools, draws	56.9	55.7 - 58.0	97.9	97.5 - 98.2	88.9	84.2 - 93.6
Other games	2.1	1.8 - 2.3	3.5	3.1 - 4.0	24.3	17.1 - 31.5
Internet gambling	1.2	1.0 - 1.4	2.1	1.7 - 2.4	14.1	8.6 - 19.5
Casino/Bingo	0.3	0.2 - 0.3	0.4	0.3 - 0.6	2.4	0.4 - 4.3
Slot machines	0.5	0.3 - 0.6	0.8	0.6 - 1.1	10.2	4.8 - 15.5
Sports bets	0.3	0.2 - 0.4	0.5	0.4 - 0.7	1.9	0.5 - 3.3

With regard to gambling addiction, 90.2% of the Galicians who declared playing a game of chance in the last year did not score any points on the SOGS questionnaire and 7% scored 1 point (Table 3). The population prevalence of gambling disorder or at-risk gambling was 1.6% (95% CI: 1.3-1.9), with 0.4% (95% CI: 0.3-0.6) classified as having gambling disorder and 1.2% (95% CI: 1.0-1.5) as at-risk gamblers. Restricting this analysis to gamblers, this prevalence was 2.8% (95% CI: 2.3-3.3): 0.7% (95% CI: 0.5-1.0) with a gambling disorder and 2.1% (95% CI: 1.6-2.5) with at-risk gambling (Figure 3). The prevalence of gambling disorder among gamblers was higher among men (1.3% vs. 0.1%) and in the 16-24 age group (2.4%) (Figure 3). Regarding the type of gambling, those with gambling disorder or at-risk gambling mostly played lottery, pools, draws and similar games, as did gamblers as a whole, but the percentage in the latter was lower [88.8% (95% CI: 84.2-93.6)]; on the other hand, it was higher in Internet gambling [14.1% (95% CI: 8.6-19.6)] and slot machines [10.2% (95% CI: 4.5-15.5)] (Table 1).

All behaviour-related variables were significantly associated with gambling disorder or at-risk gambling in the bivariate analysis ($p<0.05$). Among the sociodemographic variables, the association was significant for sex, age group, educational level and living with a partner. When adjusting the multivariate model, it was found that the characteristics independently associated with gambling disorder or at-risk gambling were being male, having risky alcohol use, spending more than two hours a day using instant messaging applications, having problematic Internet use, playing games of chance other than the lottery, and playing the lottery every week. The adjusted OR of each variable, together with its 95% confidence interval, is shown in Figure 4, where it is observed that all values are greater than 2, and that problematic Internet use multiplies the probability of having a gambling disorder or at-risk gambling by 10.

Figure 2
Percentage distribution of gamblers playing lottery, pool or draws, by gambling frequency. The data are presented by sex and age group. Galicia, SICRI-2017

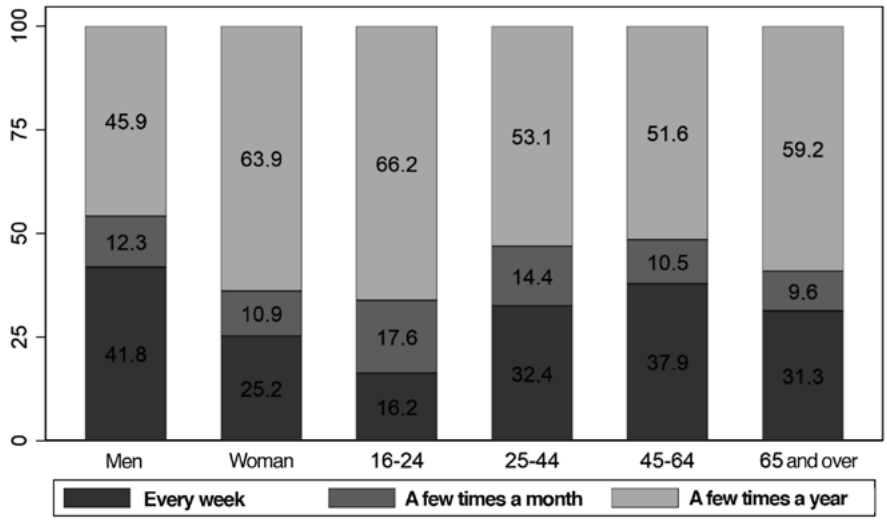


Table 2
Percentage of people aged 16 and over who spent money on Internet gambling in the last 12 months, by sex and age group. Data for the entire population and gamblers, with 95% confidence interval (95% CI). Galicia, SICRI-2017

	In the entire population				In the gamblers			
	n	%	CI95%		n	%	CI95%	
All	**7,841**	**1.2**	**1.0**	**1.4**	**4,142**	**2.1**	**1.7**	**2.4**
By sex								
Male	3,914	2.4	1.9	2.8	2,346	3.7	3.0	4.4
Female	3,927	0.1	0.0	0.2	1,796	0.2	0.1	0.4
By age group								
16-24 years	1,829	6.3	5.2	7.4	501	22.8	19.2	26.5
25-44 years	2,007	2.0	1.4	2.6	1,159	3.3	2.3	4.4
45 years and over	4,005	0.2	0.1	0.3	2,482	0.3	0.1	0.5

Table 3
Distribution of the population and gamblers aged 16 and over by scores obtained in the South Oaks Gambling Screening questionnaire. Percentages with 95% confidence intervals (95% CI). Galicia, SICRI-2017

	In the entire population			In the gamblers		
	%	CI95%		%	CI95%	
Do not gamble	41.9	40.8	43.1			
0 points	52.4	51.2	53.5	90.2	89.3	91.1
1 point	4.1	3.6	4.5	7.0	6.2	7.8
2 points	0.9	0.7	1.1	1.6	1.2	2.0
3 points	0.3	0.2	0.4	0.5	0.3	0.7
>=4 points	0.4	0.3	0.6	0.7	0.5	1.0

Figure 3
Percentage of gamblers aged 16 years and older scoring 1 point, 2-3 points and 4 points or more in the South Oaks Gambling Screening questionnaire, by sex and age group, with 95% confidence interval (95% CI). Galicia, SICRI-2017

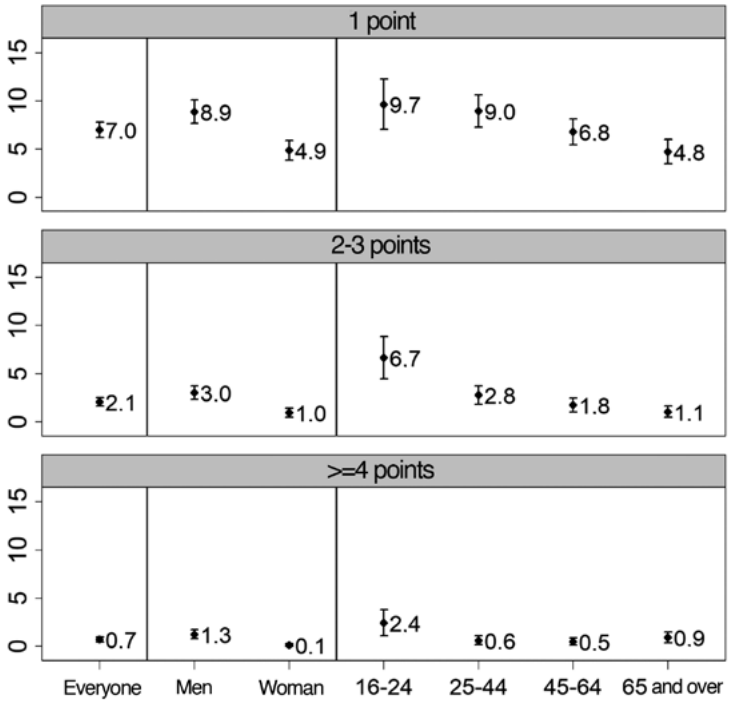
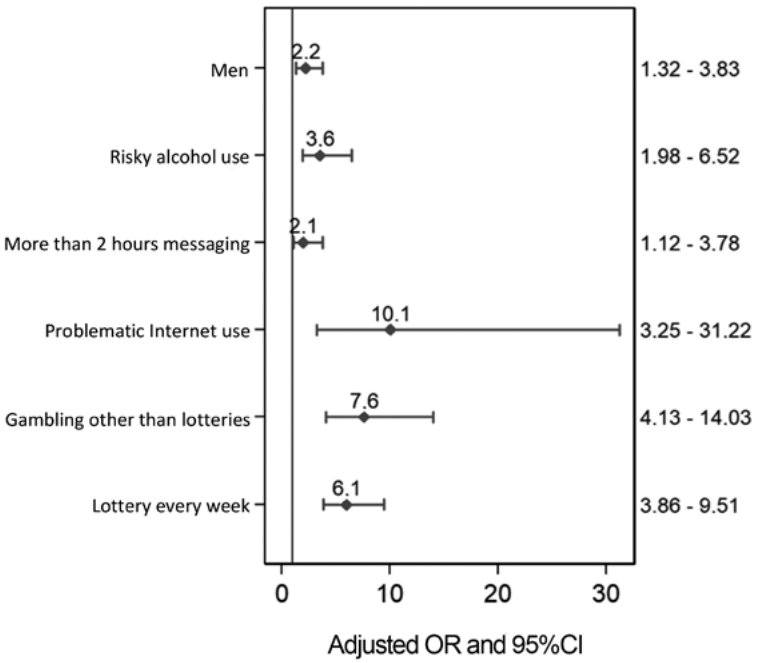


Figure 4
Characteristics associated with, or at risk of, gambling disorder. Odds ratios (OR) adjusted with 95% confidence interval (95% CI). Galicia, SICRI-2017



Discussion

In the last year, 58.1% of the Galician population aged over 15 spent money on games of chance, mainly in lottery, pools, draws and similar. The prevalence of gamblers was higher in men and in the population aged 45 to 64 years. Among Galicians between the ages of 16 and 24, 16 out of 100 placed bets online. Of the Galician population in general, 0.4% had a gambling disorder and 1.2% had at-risk gambling; among gamblers, these prevalences were 0.7% and 2.1%, respectively.

The estimated prevalence of gamblers in Galicia in this study is lower than that obtained for the whole of Spain in the 2015 study on the prevalence of gambling in the population aged 15 years and over (67.0%) (Dirección General de Ordenación del Juego, 2015) and similar to that estimated by the 2017 Spanish survey on alcohol and other drugs (EDADES) among the population aged 15 to 64 years (60.2%) (Observatorio Español de las Drogas y las Adicciones et al., 2019). The sociodemographic characteristics of gamblers identified in both studies are similar, with the gambler profile being a man aged between 45 and 64 years.

As in the EDADES-2017 survey, among the most frequent gambling modalities in Galicia were lotteries, pools, and draws, while online bets were the second option. Thus, 1 in 100 Galicians aged 16 and over, 25,890, placed bets online and of those, 10,278 were aged 16 and 24 years. This is an important aspect since it is precisely online gambling that is more addictive than any other type of gambling (Monaghan, 2009; Wood, Williams & Parke, 2012) and is the main cause of gambling addiction in younger people (Chóliz, 2016). Among the European 16-year-old student population, 16.2% acknowledged having gambled online in the last 12 months (Molinaro et al., 2018). In Galicia, in this study, we estimate the prevalence of online gambling in 16-year-olds at 11.9% (data not shown in results). In fact, although gambling is illegal for minors, according to SICRI-2017 data (not shown in results) up to 19.4% of men and 3.8% of women aged between 16 and 17 years spent money on some type of game of chance, either in person or online. Higher figures were obtained among 16-year-old students in Europe (31.6% men vs. 13.8% women) (Molinaro et al., 2018). From a clinical point of view, these data are worrying since early exposure to gambling increases the risk of gambling-related problems in adult life (Burge, Pietrzak, Molina & Petry, 2004; Dowling et al., 2017).

Although it might seem that in Galicia the prevalence of problems associated with gambling is low, 0.4% of Galicians are gamblers with a gambling disorder and 1.2% have at-risk gambling. The prevalences obtained indicate that 38,399 Galicians have problems with gambling. In addition, it is important to note that it is precisely among the youngest population, aged 16 to 24 years, that the highest prevalence, 9.1%, is observed.

In Galicia, three previous studies were carried out, in 1991, 1993 and 2001, in which the prevalence of problems related to gambling in the adult population was estimated (Becoña, 1993; Becoña &Fuentes, 1995; Becoña, 2004). Given changes in the design, in the measurement instrument or in the age of the population under study, an accurate assessment of the development of the prevalence of gambling problems among the Galician population is not possible. From the first to the current estimates, a decrease in the point prevalence estimates is observed, but the presentation of results in previous studies, which did not include the precision of the estimates presented (in no case were confidence intervals included), could point to a stabilization of prevalences scenario. Thus, the 1993 study in Galicia, using SOGS, estimated the prevalence of gamblers with a gambling disorder (labelled pathological gambling in the study) to be 1.4% (n = 14) and of gamblers with problematic gambling (problem gamblers in the study) to be 2.0% (n = 21) (Becoña et al., 1995). In the present study, these prevalences, using the same instrument, are estimated at 0.7% (0.5-1.0) and 2.1% (1.6-2.5), respectively, so that the changes observed in the point estimates of the prevalence of gamblers with gambling disorder could be residual. The latest estimates available for Galicia are from a study carried out in 2001 in a population aged 18 years and over, applying the NODS (National Opinion Research Center DSM-IV Screen for Gambling Problems). In this study it was estimated that the prevalence of at-risk gamblers was 0.25%, gamblers with problematic gambling 0.25% and gambling disorder 0.31% (Becoña, 2004). These prevalences are lower than those obtained for Galicia in 2017 and those obtained in Spain in 2015 by applying the NODS questionnaire (Dirección General de Ordenación del Juego, 2015). Nevertheless, it should be taken into account that the NODS is considerably more restrictive when it comes to identifying people with gambling problems compared to the SOGS, which, according to some authors, may overestimate prevalences when applied to population samples (Raylu & Oei, 2002). The two studies are separated by 16 years and gambling has changed in our environment (Abbott, 2020).

The characteristics of Galicians with gambling disorders or at-risk gambling coincide with those of other studies carried out in Spain, being more likely among men and among those gamblers with risky alcohol use (Echeburúa, González-Ortega, de Corral & Polo-López, 2013; Jauregui, Estévez & Urbiola, 2016). Problematic Internet use or messaging for more than two hours a day are other characteristics that increase the probability of gambling disorders or at-risk gambling. Previous studies had already found that people with these behaviours shared similar personality traits and emotional distress (Mallorquí-Bagué et al., 2017).

Among the limitations of this study, it should be noted that in estimating the prevalence of gambling disorder or at-risk gambling, the questions included in the SOGS ques-

tionnaire related to being in debt were not applied. This could cause an underestimation of the prevalence, since the nine questions about who people ask for money to spend on gambling were not included. It is important to explain that the debt questions are aimed at those people who answer positively to the question: "Have you ever borrowed money to gamble or to pay gambling debts?" Of the 4,142 people who claimed to have spent money on gambling in the 12 months prior to the survey, only 19 answered affirmatively to this question and of these, 12 had already scored 4 points or more in the previous questions, meaning that they were already classified as having gambling disorder. Two of them had 3 points, and since they would have at least one more point in the debt questions, they would also be classified as having gambling disorder. Only 5 cases with 1 or 2 points were excluded from the analysis since it was not possible to know whether the debt questions would add one or more points. This allows us to conclude that the impact of these questions related to debt in estimating the prevalence of gambling disorder is very low. Therefore, the non-inclusion of these questions, which take up considerable time in the application of the questionnaire, in this case have an imperceptible impact on the estimated prevalence. On the other hand, having identified only 37 people with gambling disorder, a comparative analysis between their characteristics and those of the rest of the sample was not possible.

Among the biases that could affect the results of this study, social desirability stands out; this can manifest itself with concealment of gambling and would particularly affect those with a gambling disorder. The inclusion of gambling questions in a questionnaire assessing other behaviours, both risky and protective, could mitigate the impact of this bias. Among the strengths of this study, it is worth highlighting the large sample size and a response rate close to 80.0%; the first guarantees the accuracy of the results, and both ensure the representativeness of the sample.

In conclusion, the percentage of the population that spends money on gambling is lower in Galicia than in Spain as a whole, yet even so, the prevalences obtained indicate that gambling is a relevant public health issue. The prevalence of gamblers, both men and women, reaches a maximum in the 45-64 years age group, but it is young men who have a higher prevalence of problems associated with gambling; thus both primary, secondary or tertiary prevention measures should target them, without forgetting other vulnerable groups. Sensitised to the problem, the regional administration of Galicia is working on modifying Law 14/1985, Regulating Gambling and Betting in Galicia. As was the case with the regulation of other health areas to do with changing behaviours such as smoking and adopting healthy lifestyles, this revision of the law incorporates both educational and regulatory measures to protect the population, especially the most vulnerable groups, and to reduce the prevalence of gambling disorders.

Conflict of interests

All authors declare that they have no conflicts of interest.

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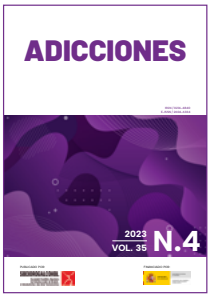

ORIGINAL

Basuco consumption in transgender women across three cities in Colombia

Consumo de basuco en mujeres transgénero, de tres ciudades de Colombia

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Abstract

This article aims to describe the factors associated with basuco consumption in transgender women (TW) in three cities in Colombia, South America. A cross-sectional descriptive study was carried out using Respondent-Driven Sampling (RDS) and included 688 transgender women participants from Bogotá, Medellín and Santiago de Cali. Descriptive analyses, bivariate associations, and a binomial regression were performed. The prevalence of basuco consumption among participants was 11%; factors associated with basuco consumption among TW included having a low socioeconomic level, living alone, feeling vulnerable to HIV, having had an STI in the last year, and consuming marijuana. Substance consumption in TW in Colombia is high when compared to the general population, and the literature shows that basuco consumption is intensified within a context of social vulnerability. Encouraging the development of policies and programs with a comprehensive approach to health and substance use prevention particularly among vulnerable TW considering their unique sociodemographic and economic characteristics, is warranted.

Keywords: transgender women, basuco, substance use, Colombia

Resumen

Este artículo tuvo como objetivo describir los factores asociados al consumo de basuco en mujeres transgénero de tres ciudades de Colombia. Se realizó un estudio descriptivo transversal, a través del muestreo dirigido por los entrevistados (MDE) y en el cual participaron 688 mujeres transgénero de Bogotá, Medellín y Santiago de Cali. Se realizaron análisis descriptivos, asociaciones bivariadas y una regresión de tipo binomial. La prevalencia del consumo de basuco fue de 11%, y los factores asociados a su consumo entre las MT fueron, ser de estrato socioeconómico bajo, vivir sola, percibirse vulnerable al VIH, haber tenido una ITS en el último año y consumir marihuana. El consumo de sustancias en las MT en Colombia es elevado al compararlo con población general, se evidencia que el consumo de basuco se enmarca en el contexto de vulnerabilidad social. Es necesario incentivar la creación de políticas y programas con un abordaje integral en salud, que tengan como uno de los ejes de acción la prevención del consumo de sustancias psicoactivas entre las mujeres transgénero, teniendo en cuenta sus particularidades y características sociodemográficas y económicas.

Palabras clave: mujeres transgénero, basuco, consumo de sustancias psicoactivas, Colombia

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Transgender women (TW) are a priority group for public health research. They suffer gender inequities, stigma and discrimination, social exclusion, pathologization of their gender identity, they have few educational and labor opportunities and guarantees, as well as precarious health conditions, since their particular needs have been invisible (Radi & Sardá-Chandiraman, 2016; Scher, 2016). Some studies report that TMs in Latin America (LA) live with a disproportionate burden of disease, disability, and risks that prevent them from effectively enjoying the right to health, as well as an immense increase in violent deaths due to prejudice, police mistreatment, persecution and low life expectancy. Moreover, it is estimated that more than 50% of them work as street vendors, or sex workers, have a low level of education, do not have access to housing, while a quarter do not use health services (Comisión Interamericana de Derechos Humanos, 2015; Organización Panamericana de la Salud, 2011; Sandoval-Rebollo, Domínguez-Cornejo & Rosales-Galarza, 2019; SInViolencia LGBT, 2019).

Within this precarious health situation TW face multiple problems, for example, the consequences derived from unsafe body transformations, reproductive health problems and Sexually Transmitted Infections (STIs), especially HIV. Stigma and transphobia have been shown to cause mental health problems, such as stress, depression, anxiety, suicidal ideation and post-traumatic stress disorder (Bazargan & Galvan, 2012; Organización Panamericana de la Salud, 2011; Yarns, Abrams, Meeks & Swell, 2016). In addition, TW are among the groups most vulnerable to the use of psychoactive substances (PAS).

Over the last decade, studies in Colombia have shown a critical rise in psychoactive substance (PAS) use, especially among the younger population; the PAS reportedly in common use are tobacco, alcohol, marijuana, cocaine and their derivatives, such as basic coca paste, known as basuco in some Latin American countries (Ministerio de Salud y Protección Social, 2015). The consumption of basuco, or *pitillo* or *Kete* as coca paste is also called in different Latin American countries, represents a problem of social inequalities and less favored groups; for this reason, it has not been the object of research, unlike cocaine. There is thus a lack of really reliable qualitative and quantitative data to help explain its use. The impurities of the product and the added substances result in lower market prices compared to cocaine hydrochloride (Téllez-Mosquera & Cote-Menéndez, 2005). Because of its impurities, basuco is known to be much more harmful than cocaine, and the substances used in its preparation prevent intravenous or intramuscular administration, resulting in its use in the form of cigarettes, pipes and other routes of pulmonary administration (Larrea-Torrelio, 2007).

Basuco is also known in North America as crack cocaine, rock and freebase, but there are some differences. Crack arises from mixing cocaine hydrochloride with sodium bicarbonate and water or ammonia, while basuco is a crude extract of the coca leaf mixed with water, sulfuric acid and kerosene, gasoline or battery water, making it an intermediate component in the preparation of cocaine hydrochloride (Dávila, Solórzano, Premoli de Percoco, Quiñones & Petrosino, 2001).

The wide availability and low cost of basuco in urban areas greatly facilitates its consumption in large quantities; in fact, the price becomes negligible if the person is also involved in the distribution of the product. In Colombia, population centers of more than one million inhabitants report greater use, with Bogotá, Medellín and its metropolitan area, and Cali in that order having the highest prevalences of cocaine use, thus indicating a similar pattern of basuco consumption (Ministerio de Salud y Protección Social, 2015). Studies have shown that the epidemiological profile of basuco users generally corresponds to people from lower strata, with little education, and mostly men (Isaza, Suárez, Henao & González, 2010; Téllez-Mosquera et al., 2005).

The effects of basuco and cocaine use are known since they are psychotropic drugs that can stimulate or accelerate the activity of the central nervous system, and their action may affect the various systems of the body. Basuco use can be predictive of generating polydrug use, raising the number of doses in injection drug users, and the probability of acquiring a sexually transmitted disease and seropositivity for HIV and hepatitis C (Berbesi-Fernández, Segura-Cardona, Montoya-Vélez & Hernández-Rendón, 2016).

There is not much evidence of specific basuco use in TW, with some reports suggesting frequent use of alcohol and other substances, especially among transgender people who practice sex work or who are on the streets (Ecker, Aubry & Sylvestre, 2019; Scheim, Bauer & Shokoohi, 2017). The most used substances are: alcohol, marijuana, cocaine and its derivatives (Reback & Fletcher, 2014). In addition, the prevalences of use in TW are higher than those in the general population, and up to ten times higher than that of trans men (TM) (Gómez-Gil et al., 2019). This use may be associated with the search for situations that help to cope with the realities of a generally difficult environment, and in order to reduce the effects of alcohol (Gómez-Gil et al., 2019; Yarns et al., 2016). Among the associated factors, it has been found that previous experience of sexual abuse increased the likelihood of cocaine use in TW in the Dominican Republic by almost three times (Budhwani et al., 2017). In Canadian TW, consumption increased among those who had experiences of transphobia, were street dwellers, and sex workers (Scheim et al., 2017). As a consequence, PAS abuse can reduce the ability to negotiate the terms of a sexual encounter, which increases the

vulnerability and risk of HIV infection and sexual violence, among others. (Santos et al., 2014; Scheim et al, 2017).

Despite the systematic increase in PAS use indicated by the studies available in Colombia and the advances that the country has made in developing epidemiological studies on drug production, trafficking and its consequences in the school and general populations, there has been scant research on basuco use. This lack of attention may be linked to the fact that its use has generally been seen as limited to the street population; however, these patterns may be changing, and other vulnerable groups, such as TW, are showing increasing use of this substance.

Given the lack of information regarding the consumption of basuco in Latin American TW, together with the limited information on consumption habits or abuse of alcohol, tobacco and illicit drugs in the trans population that has been growing in recent years, this article aims to characterize the factors associated with basuco use in TW in Colombia.

Method

Study type and general design

A descriptive cross-sectional study was carried out, using the database of a national study entitled: "Vulnerabilidad al VIH y prevalencia de VIH en mujeres transgénero en tres ciudades de Colombia: Bogotá, Medellín y Santiago de Cali" between May and September 2019 (Berbesi et al., 2019). The cities prioritized for this study are the three with the highest estimate of trans women in Colombia and also have the highest HIV prevalences in key populations: men who have sex with men (MSM), and transgender women (Ministerio de Justicia y del Derecho y Ministerio de Salud y Protección Social, 2014).

Procedures and participants

Respondent-driven sampling (RDS) was used, a methodology which is ideal for achieving sample representativeness in those groups where the sampling frame is unknown or which are called "hidden populations", such as that of transgender women. Recruitment is similar to snowballing or chain referrals, since by collecting data on the size of the social network and limiting the recruitment coupons given out, the results can be adjusted to represent the networks of the sampled population (Carballo-Diéguez et al., 2011).

Taking into account RDS theory, nine seeds were initially sought for the recruitment process (three in each city), which ended with the inclusion of 20 seeds in the three cities to reach the required sample size. These were identified through social organizations, key actors in the population and institutional actors. Seeds were selected who stated that they were able to reach a large group of trans women, who had leadership, visibility, and recognition, and were diverse in terms of their sociodemographic characteristics, while meeting minimum eligibility criteria: assignment of male sex at birth, identification with female gender, of legal age and residing in the cities of Bogotá, Medellín (metropolitan area), and Cali (metropolitan area) and having Colombian citizenship.

All participants, including the seeds, were given three coupons to recruit other eligible participants from their social networks. This chain recruitment system continued until a total of 668 participants (excluding seeds) was reached. Following the RDS theory, each person was given an incentive for participating in the study (a supermarket voucher worth COP 40,000, approximately USD 12) and a secondary one linked to the successful recruitment of three new participants (COP 30,000 in cash, approximately USD 9). Sample size was reached within 18 weeks.

Instrument and variables

A survey meeting the guidelines for repeated behavioral surveys in populations at risk of HIV was applied (Family Health International, 2000), adjusted in Colombia by a group of experts from the funding entity. This survey was divided into 12 sections: social and demographic characteristics, health and access to services, body transformations, sexual history, sexually transmitted infections, practicing sex work, condom and lubricant, knowledge about HIV/AIDS, exposure, intervention and HIV test, use of psychoactive substances, social networks and stigma/discrimination. In addition, rapid HIV tests were performed and those testing positive were confirmed through an Elisa test with filter paper. Basuco use was set as the outcome variable through the yes/no question: Have you smoked or inhaled *pipa*, crack or basuco in the last 6 months? The control variables of the study were: age, educational level (none/preschool/primary, secondary, technical or technological, and university/graduate), occupation (employed/independent, hairdresser/dressmaker, none/student, and prostitution/show/webcam), marital status (single, married/partner/widowed), socioeconomic stratum (used in Colombia for classifying residential properties that should receive public services; the lower the stratum the lower the economic capacity), income (according to legal minimum monthly wage current in Colombia –SMMLV– in 2019, approximately COP 925,000 or USD 289), living alone (yes/no), social support (yes/no), vulnerability to HIV (low, medium-high), sexually transmitted infections in the last year (yes/no), HIV diagnosis (positive/negative), discrimination in the last year (yes/no), lifetime money in exchange for sex (yes/no), cocaine use (yes/no), marijuana (yes/no) and alcohol (yes/no), in the last 6 months, forced relationships in the last year (yes/no), casual partners in 6 months (yes/no) and discomfort/health problems in the last year (yes/no).

The surveys were applied electronically, by personnel trained for this purpose, in a venue located in each city in a place accessible to the population.

This study was approved by the ethics committee of CES University, in a session on February 19, 2019. The requirements of the Scientific, Technical and Administrative Standards for Health Research were followed, according to Resolution 008430 of October 4, 1993 of the Ministry of Health of Colombia, classified as research with minimal risk. All participants signed an informed consent where they voluntarily agreed to be part of the study.

Analysis

For the bivariate analyses performed using chi square, TW records that did not have data on whether they had consumed basuco or not were excluded, resulting in a total of 618 observations. Two logistic regression models (unadjusted and adjusted) were then built in order to explore the factors associated with basuco use. In the logistic regression models, the outcome variable (basuco) was included with each of the study variables using the 'enter' method. In the multivariate model, the significant variables ($p < 0.05$) were entered in the bivariate analysis. Data were analyzed with RDSAT and weighted in SPSS®, version 21, with institutional license.

Results

Results show that the TW participating in the research were mostly young, with an average age of 32.9 years (SD = 12.7), with 46.9% practicing sex work/webcam and shows as their occupation, followed by 23.5% who were hairdressers or dressmakers. By socioeconomic stratum, 39.9% were found to be from stratum three or higher, 33.6% from stratum two and 26.5% from stratum one. A large majority (79.1%) were single, the rest were married, living with partners or widowed. In terms of educational level, 86.1% finished high school or had a higher education. More than half of the TW received a monthly minimum wage or less than this, 68.5% lived with someone, 35.6% had dependents and 60.0% had support or help from a family member or friend in case of need (Table 1).

Table 1
Sociodemographic characteristics by basuco use in TW

Variables		Basuco		*p**
		Yes	No	
	(n %)	68 (11.1%)	549 (88.9%)	
Age				
18-24 years	187 (27.2)	14 (7.5)	173 (92.5)	**0.048**
25-34 years	249 (36.2)	29 (11.6)	220 (88.4)	
35-44 years	106 (15.4)	19 (17.9)	87 (82.1)	
45 years and over	146 (21.2)	14 (9.6)	132 (90.4)	
Occupation				
Employee/freelance	104 (17.6)	17 (16.3)	87 (83.7)	0.052
Hairdresser/dressmaker	139 (23.5)	8 (5.8)	131 (94.2)	
Unemployed/student	71 (12.0)	15 (21.1)	56 (78.9)	
Prostitution/show/webcam	277 (46.9)	28 (10.1)	249 (89.9)	
Stratum				
Stratum 1	158 (26.5)	34 (21.5)	124 (78.5)	**0.001**
Stratum 2	200 (33.6)	14 (7.0)	186 (93.0)	
Stratum 3 or higher	238 (39.9)	20 (8.4)	218 (91.6)	
Marital status				
Single	483 (79.1)	55 (11.4)	428 (88.6)	0.416
Married/with partner/widowed	128 (20.9)	13 (10.2)	115 (89.8)	
Educational level				
None/preschool/primary	86 (13.9)	13 (15.1)	73 (84.9)	0.087
Secondary	424 (68.6)	49 (11.6)	375 (88.4)	
Technical/technology	108 (17.5)	6 (5.6)	102 (94.4)	
Income				
No income	81 (13.2)	15 (18.5)	66 (81.5)	**0.013**
Minimum wage or below	320 (52.2)	41 (12.8)	279 (87.2)	
Between one and two minimum wages	127 (20.7)	7 (5.5)	120 (94.5)	
More than two minimum wages	85 (13.9)	6 (7.1)	79 (92.9)	
Living alone				
Yes	195 (31.5)	80 (41.0)	115 (59.0)	**0.028**
No	425 (68.5)	139 (32.7)	286 (67.3)	
Social support				
Yes	367 (60.0)	30 (8.2)	337 (91.8)	**0.002**
No	425 (68.5)	139 (32.7)	286 (67.3)	

**Note. p* <0.05 values in bold.

Regarding other characteristics, it was found that more than 62.7% of TW saw themselves as vulnerable to HIV, 12.8% had an STI in the previous year, 82.5% had suffered some type of discrimination, 4.1% were forced to have sexual relations in the previous year, 12.1% of those surveyed said they had sex without a condom, 49.3% had had occasional partners in the last year and 39.1% had health problems in the previous year (Table 2).

Regarding the use of PAS, 30.6% reported having used cocaine, 51.7% marijuana, 70.7% alcohol and 11% basuco in the 6 months prior to the survey, with important differences by city. Bogotá is the city with the highest prevalence of basuco consumption (17.6%), Medellín reports the highest prevalence of marijuana use (61.6%) and Cali reports the highest consumption of cocaine (37.7%) (Figure 1).

When performing the analysis of basuco use with the variables of interest, a statistically significant association was found between basuco use and being aged between 25 and 44 years, being from socioeconomic stratum one, not having social support, living alone, feeling vulnerable to HIV, having had an STI, using cocaine, marijuana, having been forced to have sex in the last year, having received money in exchange for sex at some point in their life, and having had health problems in the last year.

In the logistic regression model, the same variables remained significant except for age. When comparing TW that consume basuco with non-users of this substance, it was found that being from stratum one increased the possibility of consumption by more than three times (OR 3.65; CI-1.291-5.452), as did living alone compared to

Table 2
Behavioral characteristics by basuco use in TW

Variables		Basuco		*p**
		Yes	No	
	(n %)	76 (11)	612 (89)	
Vulnerability to HIV				
Low	200 (37.3)	11 (5.5)	189 (94.5)	**0.002**
Medium-high	336 (62.7)	45 (13.4)	291 (86.6)	
HIV				
Positivo	167 (27.3)	23 (13.8)	144 (86.2)	0.130
Negativo	444 (72.7)	45 (10.1)	399 (89.9)	
STI				
Yes	78 (12.8)	20 (25.9)	58 (74.4)	**0.000**
No	533 (87.2)	48 (9.0)	485 (91.0)	
Cocaine				
Yes	187 (30.6)	29 (15.5)	158 (84.5)	**0.018**
No	424 (69.4)	39 (9.2)	385 (90.8)	
Marijuana				
Yes	316 (51.7)	55 (17.4)	261 (82.6)	**0.000**
No	295 (48.3)	13 (4.4)	282 (95.6)	
Alcohol				
Yes	431 (70.7)	42 (9.7)	389 (90.3)	**0.061**
No	179 (23.3)	26 (14.5)	153 (85.5)	
Discrimination				
Yes	107 (17.5)	15 (14.0)	92 (86.0)	0.205
No	504 (82.5)	54 (10.7)	450 (89.3)	
Forced sexual relations in the previous year				
Yes	25 (4.1)	6 (24.0)	19 (76.0)	**0.049**
No	586 (95.9)	62 (10.6)	524 (89.4)	
Use of condoms				
Yes	537 (87.9)	57 (10.6)	480 (89.4)	0.184
No	74 (12.1)	11 (14.9)	63 (85.1)	
Receiving money in exchange for sex at least once, lifetime				
Yes	491 (80.5)	62 (12.6)	429 (87.4)	**0.010**
No	119 (19.5)	6 (5.0)	113 (95.0)	
Occasional partners in the last 6 months				
Yes	301 (49.3)	28 (9.3)	273 (90.7)	
No	310 (50.7)	40 (12.9)	270 (87.1)	0.099
Health complaints or problems				
Yes	239 (39.1)	43 (18.0)	196 (82.0)	**0.000**
No	373 (60.9)	26 (7.0)	347 (93.0)	

**Note. p* <0.05 values in bold.

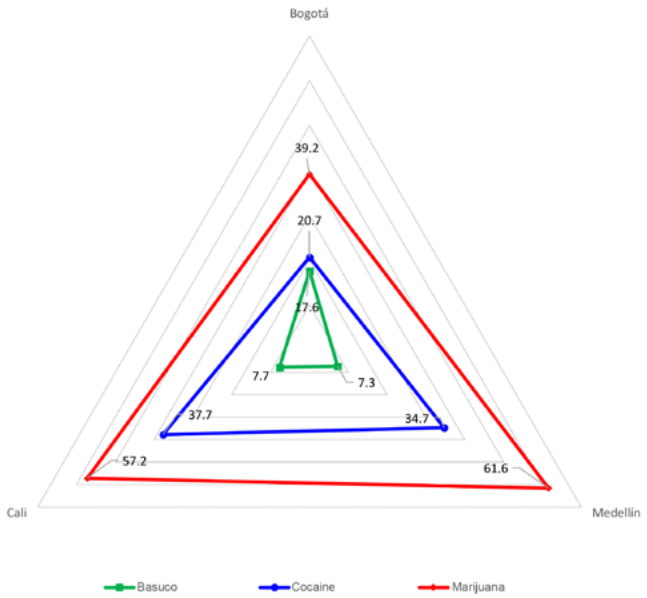
Table 3
Factors associated with basuco use in TW

Variables	Unadjusted model OR (95%CI)	Adjusted model AOR (95% CI)
Age		
18-24 years	1.17 (0.514-2.260)	
25-34 years	1.74 (0.817-3.688)	
35-44 years	1.92 (0.772-4.776)	
45 years and over	1	
Stratum		
Stratum 1	2.93 (1.620-5.310)	3.65 (1.291-5.452)
Stratum 2	0.78 (0.384-1.606)	0.77 (0.347-1.71)
Stratum 3 or higher	1	1
Income		
No income	3.10 (1.117-8.616)	
Minimum wage or below	2.01 (0.807-5.016)	
Between one and two minimum wages	0.85 (0.276-2.64)	
More than two minimum wages	1	
Living alone		
Yes	2.47 (1.474-4.124)	2.75 (1.477-5.114)
No	1	1
Social support		
Yes	1	
No	2.13 (1.283-3.548)	
Vulnerability to HIV		
Low	1	1
Medium-high	2.65 (1.339-5.256)	2.33 (1.109-4.903)
STI		
Yes	3.56 (1.981-6.382)	2.97 (1.414-6.252)
No	1	1
Cocaine		
Yes	1.80 (1.080-3.018)	
No	1	
Marijuana		
Yes	4.65 (2.48-8.71)	3.49 (1.474-4.124)
No	1	1
Forced sexual relations in the previous year		
Yes	2.72 (1.049-7.068)	
No	1	
Receiving money in exchange for sex at least once, lifetime		
Yes	2.71 (1.148-6.401)	
No	1	
Health complaints or problems		
Yes	2.96 (1.760-4.981)	2.37 (1.477-5.714)
No	1	1

those who lived with someone (OR 2.75; 95% CI -1.477-5.114).

TW who felt vulnerable to HIV were 2.3 times more likely to consume; this likelihood increased similarly (by 2.9 times (OR 2.97; CI-1.41- 6.25)) in those who had an STI in the last year. It was found that the use of marijuana increased the probability of basuco consumption by 3.4 times and that among the TW reporting a health problem this consumption potential was also increased with respect to those that did not report problems (OR 2.37; CI- 1.477-5.714) (Table 3).

Figure 1
Prevalence of psychoactive substance use by city in trans women in Colombia



Discussion

According to the literature search carried out, this study is the first to date to determine basuco use in Colombian TW. The main finding is a prevalence of basuco use among TW of around 11%. Despite the fact that this substance is commonly used in the country, there is little research on its use in vulnerable groups. The findings show that the use of this substance in this population is associated with a combination of socioeconomic, behavioral and social environment conditions which complicate intervention approaches, as has been reported in other research on the subject (Family Health International, 2000; SIIS Centro de Documentación y Estudios, 2014).

The sociodemographic profile of basuco users shows a panorama of social vulnerability, with consumption predominating in the TW of stratum one, aged 32 years on average, who completed high school, do not receive an income, do not work or are students. Similar results were reported in a review carried out by the Organization of American States (2014), in users of cocaine base paste in Latin America, which had the following in common: average user age of around 30 years, average educational level, without an income, not working, with a large percentage of street dwellers and a high probability of engaging in risky sexual behaviors. In addition, other factors that were found in this study were that the TW lived alone and did not feel that they had social support; the situations characterizing their living conditions are another factor, because many TW are expelled from their homes at an early age due to the stigma and discrimination and have poor social networks, a finding that was also reported in an injection drug user population (Berbesi-Fernández et al., 2016).

One of the most prominent results was problematic PAS use among TW. High prevalences of cocaine, marijuana and alcohol use were reported, at considerably higher percentages than those observed in cisgender women and even in other groups with high prevalences such as MSM (Valencia et al., 2018). This situation, which was already known in basuco users, was also reported in a national survey in Uruguay in which it was observed that practically all users of "base paste" were poly-users, and that more than half the demand for rehabilitation occurred in users of this drug, given its "highly addictive" characteristics and the high vulnerability of its users (Observatorio Uruguayo de Drogas, 2014).

On comparing the consumption prevalences found in this study with those reported in other international studies, it was found that in TW in San Francisco (United States) the most widely used substance was marijuana (29%), 13.4% consumed crack cocaine, and 58% drank alcohol (Santos et al., 2014). Meanwhile, a study in Houston (United States), reported a prevalence of cocaine and/or cocaine paste use of 40%, high rates of intimate partner violence, sexual violence and suicidal ideation (Risser et al., 2005). Among Colombian TW, marijuana and alcohol use was higher, with a slightly lower percentage for basuco use, but one which was higher when compared to the use of this substance in TW in the Dominican Republic, which was 5.3% (Budhwani et al., 2017). In addition, the findings are consistent with those of the survey on PAS use in Colombia, which shows that the most widely used illicit substance was marijuana, followed by cocaine; on the other hand, it has been reported that only 1.2% of those surveyed had used basuco at some point in their life (Keuroghlian, Reisner, White & Weiss, 2015; Ministerio de Justicia y del Derecho y Ministerio de Salud y Protección Social, 2014).

The relationship between alcohol or recreational drug use, risky sexual behaviors and STIs is quite solid and is known as "chemsex", especially in MSM research, with consistent results found in the present study, in which the use of basuco increased the risk of contracting STIs (Organization of American States, 2014; SIIS Centro de Documentación y Estudios, 2014). The literature describes the increased likelihood when using psychoactive substances of engaging in risky sexual behaviors, such as having multiple partners or sexual encounters in a single night, exchanging sex for drugs, a reduced ability to negotiate unsafe sexual encounters, or suffering sexual violence, the latter showing a statistical association in the present study (Valencia et al., 2018). Although no association was found between basuco and HIV infection, as has been reported in other research, a significant percentage of TW using this drug were seropositive (Millar et al., 2018).

Mental health and drug use in TW is reported as an important problem in this population; systematic collection of information in this field, however, is completely lacking, with no surveys specifically directed at the trans population. This is due not only to the difficulties involved in sampling, but also because they are not prioritized on the public health agenda. There are few strategies with a differential approach to prevent PAS use in Colombia, and programs have focused especially on schoolchildren, adolescents and street dwellers. TW as a group have been excluded from social programs, and they generally find themselves in problematic work and social environments, where the sale and consumption of drugs is affordable, especially basuco at such low prices.

It is therefore recommended that the creation of policies and programs with a comprehensive approach to health be encouraged, which should include a dimension of action focusing on the prevention of PAS use in the trans population, taking into account their particularities and sociodemographic and economic characteristics.

Given that this was a cross-sectional study, it was not possible to establish temporal sequence or causality. As it was based on self-reports, TW may in some cases have forgotten details regarding some questions; RDS is considered sample dependent on the social network, which may have limitations when reporting population estimates, affecting the generalizability of the results obtained.

A strength of this study was being the first of its kind carried out in Colombian TW using RDS methodology; it is also the first to report on basuco use in this population, which could help to implement prevention strategies. It is recommended that mental health studies be carried out in the trans population which explore the factors associated with basuco use and include the young trans population, since there is little data in Colombia regarding this population and onset or patterns of use.

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Conflict of interests

The authors of this article declare no conflicts of interest.

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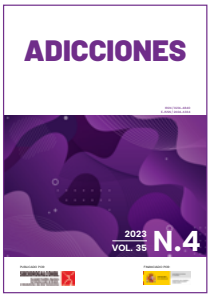

ORIGINAL

Loot boxes use as a new form of gambling within video games

El consumo de loot boxes *como una nueva forma de azar en los videojuegos*

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Abstract

Loot boxes are items within video games which players pay to open and, ultimately, to randomly obtain an object whose value is initially unknown. Being easily accessible for both teenagers and adults, loot boxes have been associated with gambling. The purpose of this study was to explore the use of loot boxes and to analyze whether it is associated with guilt, loss of control, and emotional distress. To this end, 475 participants (266 adolescents and 209 adults) were surveyed on their habits regarding loot boxes and gaming. The results showed that teenagers invest more money in loot boxes than adults. This expenditure increases when a new item is announced on online platforms (Twitch, YouTube). Additionally, not obtaining the coveted items, which is common due to loot box randomness, predicts greater levels of guilt and emotional distress, while obtaining them predicts subsequent loss of control. Thus, 45.5% reported guilt over purchasing, 50% distress and 17% loss of control. Summarizing, loot boxes are increasingly present in video games, and owing to their psycho-emotional outcomes, it is necessary for future research to address this matter in order to develop prevention strategies and to provide support to vulnerable populations.

Keywords: loot boxes, problematic gambling, video games, adicction, gambling

Resumen

Las *loot boxes* son cajas dentro de los videojuegos que los usuarios pagan por abrir y obtener, al azar, un objeto cuyo valor inicialmente desconocen. Tanto la población adolescente como la adulta tiene fácil acceso a ellas, y se han relacionado con el juego de azar. El objetivo de este estudio fue examinar el consumo de *loot boxes* y explorar si se asociaba con culpabilidad, pérdida de control y malestar. Para ello, 475 participantes (266 adolescentes y 209 adultos) respondieron a un cuestionario *ex profeso* de elaboración propia. Los resultados mostraron que son los adolescentes los que más dinero invierten en cajas botín. Este gasto se ve aumentado cuando se anuncia nuevo contenido en las plataformas multimedia *online* (entre ellas, Twitch, YouTube). Además, no obtener los ítems que desean, lo cual es frecuente por su aleatoriedad, predice mayores niveles de culpabilidad y malestar, mientras que su obtención predice la posterior pérdida de control. Así, el 45,5% de los participantes refirieron culpabilidad tras la compra, el 50% malestar y el 17% pérdida de control. En síntesis, las *loot boxes* están cada vez más presentes en los entornos virtuales de los adolescentes y adultos, y dadas las consecuencias psicológicas y emocionales que parecen tener, es necesario seguir abordando esta problemática en futuras investigaciones en aras de prevenir y apoyar a la población vulnerable.

Palabras clave: *loot boxes*, juego patológico, videojuegos, adicción, cajas botín

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The world of video games is continually expanding in most countries. In Spain, they have become the main form of audio-visual and cultural leisure, prevailing over music and cinema, with a total of 15 million users (Asociación Española de Videojuegos, 2019), most of whom are aged between 6 and 24 (*Interactive Software Federation of Europe* [ISFE], 2017). Although the majority spend an average of 1 to 2 hours a day on video games, it is estimated that 3% exceed 3 hours (Rodríguez, Megías, Calvo, Sánchez & Navarro, 2002). This amount of game time can be considered problematic or abusive given the potential interference with daily activities at academic (Lloret, Cabrera & Sanz, 2013) and interpersonal levels (Ameneiros & Ricoy, 2015), for example.

Abusive use of technology and, specifically, video games, has attracted the attention of the scientific community due to the consequences it may have on the psycho-emotional well-being of young people, so much so that the World Health Organization (WHO) has included "Video game use disorder" (WHO, 2019) as a new diagnostic category of addictive behaviours within ICD-11. However, this categorization is seen as controversial on two grounds: they do not seem to share exactly the same mechanisms as addictive behaviours (Perales et al., 2020), and, in addition, it implies that the beneficial effects they may have in different contexts, such as education, are ignored (Eguia-Gómez, Contreras-Espinosa & Solano-Albajes, 2012; Griffiths, 2010). All in all, video game addiction has been widely studied (Ferguson, Coulson & Barnett, 2011; Männikkö, Ruotsalainen, Miettunen, Pontes & Kääriäinen, 2020).

New dynamics are currently emerging to promote the intensive use of video games, yet given the speed at which this medium is evolving, they have not been documented in depth. One such case is loot boxes, a recent phenomenon characterized by the veiled introduction of gambling elements in video games (Zendle, Cairns, Barnett & McCall, 2020), which has led to them being described as a gateway to other forms of gambling (Zendle & Cairns, 2019). Taking into account the growth in recent years in the demand for psychological treatment in relation to pathological gambling, exploring all phenomena that may constitute risk factors for the appearance of these behaviours is a priority. Thus, while loot boxes have become the object of growing interest in other countries, where their regulation is currently being debated, this phenomenon has not been formally investigated or regulated in countries like Spain.

Loot boxes are items in video games that players pay to open and randomly obtain different objects (characters, weapon skins, new cards), but without previously knowing the value of the product. (Abarbanel, 2018; Drummond & Sauer, 2018; Griffiths, 2018; King & Delfabbro, 2019). These items come not only in the traditional shape of boxes, but also in the form of chests, packages and/or envelopes (Griffiths, 2018), adapted to the video game theme. The items contained are generally categorized from common (e.g., cosmetic, without major significance for the game) to legendary (acquiring these gives players a differentiating characteristic, such as empowered cards or greater damage from a weapon). In addition, in certain video games, these items may be tradable (Abarbanel, 2018), that is, they can be exchanged for other objects of similar value or sold, either for symbolic money from the game itself (e.g., FIFA coins) or for real money through third parties (e.g., websites for buying and selling items).

Although not all video games have loot boxes, many, especially the most popular ones among gamers, do (Zendle, Meyer, Cairns, Waters & Ballou, 2020). Such boxes are a frequent mechanism in freemium games (free-to-play + premium), for example, games that combine a free mode with a microtransaction system (Neely, 2019). They are also found, however, in so-called triple-A games that have large development and marketing budgets and are usually market leaders (e.g., NBA2k).

An essential feature of loot boxes is that they seem to share the same mechanisms as traditional games of chance. In fact, current research has linked both dynamics (Drummond et al., 2018; Zendle, Meyer & Over, 2019), finding that players obtaining more loot boxes are more likely to play other games of chance (Drummond, Sauer, Ferguson & Hall, 2020; Li, Mills & Nower, 2019). Loot boxes have thus been considered a form of "predatory monetization" within video games, that is, "purchaising systems that disguise or withhold the long-term cost of the activity until players are already financially and psychologically committed" (King & Delfabbro, 2018). For all these reasons, studies have been carried out to explore the potential of loot boxes to generate addiction (Brady & Pretince, 2019; Drummond et al., 2018). Although the research is at an early stage, the central element that could confer addictive potential to loot boxes is the variable (Drummond et al., 2018; Larche, Chini, Lee, Dixon & Fernandes, 2021) or random reward mechanism (Navas & Perales, 2014), depending on the algorithm underlying the loot box in the different video games. As a result of these mechanisms, environmental cues, including aspects such as eye-catching visual and sound effects (Parke, Parke & Blaszczynski, 2016) and near-misses (Zendle et al., 2020) could become excessively powerful incentives, ultimately leading to loss of control (Berridge & Robinson, 2016). Additionally, other characteristics such as the randomness of results (Zendle et al., 2020), profit expectation and no-skill requirement (King et al., 2019) could also contribute to this.

Although all players have access to loot boxes, children, adolescents and young adults, representing the majority of the gaming population, are more exposed (ISFE, 2017).

This is an important issue since some authors warn of this population's greater vulnerability to gambling due to their lower impulse control compared to adults (Drummond et al., 2018).

There are various mechanisms to encourage the use of loot boxes among gamers, including the visualization of boxes being opened and other players subsequently obtaining the desired items (King et al., 2018; Zendle, 2020), so that platforms such as YouTube or Twitch can play an important role in their acquisition. Focusing on electronic sports or eSports (massive online games), Meduna, Steinmetz, Ante, Reynolds and Fiedler (2019) found a positive link between betting on these competitions and a greater purchase of loot boxes. As in traditional gambling, the purchase of loot boxes creates the illusion that in exchange for their outlay, players can obtain an advantage, although the chances of winning the desired special items in loot boxes are minimal (Griffiths, 2018).

All in all, the acquisition of loot boxes seems to be prevalent among gamers. A study carried out by the United Kingdom Gambling Commission in 2018 found that 54% of adolescents between 11 and 16 years old were aware of the possibility of buying loot boxes, and that 31% had already paid real-world money to open them. In the case of adults, Zendle and Cairns (2018) found that 78% had bought loot boxes.

While the use of loot boxes seems to be associated with negative consequences for gamers (Schwiddessen & Karius, 2018; Zendle et al., 2018; 2019), the specific effects, both short and long term, have not yet been sufficiently studied. However, given that loot boxes can be considered a form of gambling (Griffiths, 2018), some of its consequences could also be involved, including guilt (Sleczka & Romild, 2020), loss of control (Moreau, Chauchard, Sévigny & Giroux, 2020) and sense of distress (Oksanen, Savolainen, Sirola & Kaakinen, 2018). The research carried out by Yücel et al. (2019) offers a detailed review of the key elements of addiction.

Taking into consideration the absence of studies on this phenomenon in our country, the present study had two objectives: 1) To analyze the use of loot boxes among players and examine variables that may be related to higher spending. Specifically, it is hypothesized that higher socioeconomic level (Meduna et al., 2019), greater number of hours spent gaming (Li et al., 2019), seeing other players open boxes (King et al., 2018) and the inclusion of new items (e.g., weapon skins, characters) will be associated with greater purchasing/spending; and 2) To analyze the effects of excessive loot box use on the psycho-emotional health of gamers. Specifically, it is suggested that, given the similarities between loot boxes and traditional gambling, players who buy loot boxes and do not obtain the desired item will experience negative emotions similar to those of gamblers, such as guilt (Sleczka et al., 2020), loss of control (Moreau et al., 2020) and perceived distress (Oksanen et al., 2018).

Method

Participants

The sample initially comprised 520 participants, but 45 of them were excluded by: (a) country of residence: wanting to study only what happens at the national level, people living in other countries were not allowed to participate (n = 24; 4.52%), and questionnaires not indicating country were rejected (n = 4; 0.75%); (b) age: given the need to divide the sample into adolescents and adults, participants not indicating this were excluded (n = 14; 2.64%); and (c) use/purchase: a small number of participants (n = 3; 0.56%) were eliminated for indicating a disproportionate and improbable outlay (e.g., €3,000 per day), considering them as potential outliers (atypical or unlikely values).

Of the total number of participants, 475 were thereby finally selected, with an average age of 19.26 (SD = 6.23). The sample was not matched in terms of sex, [χ^2 (1, N = 475) = 43.05; p = .000], with 309 men (65.05%) and 166 women (34.95%), a ratio consistent with the literature, which reflects a greater male representation in the use of video games (Willoughby, 2008).

The sample was divided into two groups: adolescents (11-18 years) and adults (aged over 18 years). The adolescent sample was made up of 266 students in compulsory secondary education (ESO in Spain) at state schools in Córdoba (Spain). Girls made up 43.23% (n = 115) and boys 56.77% (n = 151) of the sample, with ages ranging from 11 to 18 years (M = 14.62; SD = 1.840). The adult sample in turn comprised 209 participants and was recruited from different social networks (Facebook, Twitter, Instagram), with 158 men (75.6%) and 51 women (24.4%), and an age range of 19 to 38 years (M = 25.17; SD = 4.65).

Following the typology of Hussain and Griffiths (2009), participants were categorized by hours dedicated to gaming: casual gamer (15 hours a week or less); regular gamer (from 15 to 30 hours a week); and excessive or hardcore gamer (over 30 hours a week). Thus, 191 (54.57%) were classified as casual gamers, 107 (30.57%) as regular and 52 (14.86%) as hardcore. Finally, only four participants (0.8%) identified themselves as content creators on online multimedia platforms (e.g., YouTube, Twitch).

Instrument

In the absence of standardized instruments to assess loot box use, a specific scale was designed for this study, comprising two parts (see annex 1). The first gathered sociodemographic data, gambling behaviour and use of loot boxes. In the second, the emotions and feelings associated with this behaviour were assessed, specifically, guilt, loss of control, and distress experienced after purchase. The

questionnaire contained 25 items with different question types: open ("What is your profession?"), dichotomous ("Do you play video games?") and polytomous ("How many hours do you spend gaming daily?").

Procedure

The data collection process differed for adolescents and adults. Information was obtained in two ways: (a) paper questionnaires, which were completed by ESO and higher secondary school students, as well as by master's degree students, and (b) a Google form, for adults, disseminated on the main social networks (Facebook, Twitter, Instagram), following the procedure used by Zendle and Cairns (2018), using the hashtags or content labels of video game containing loot boxes. The Declaration Helsinki (Art. 25) guidelines and the Organic Law 3/2018 on Data Protection (Art.7) were followed in all aspects of the research. Participation was voluntary. In the case of the adolescent sample, randomly selected schools were asked to participate by telephone, using the list of schools and their contact details shown on the website of Andalucía's regional government Ministry of Education. Prior approval and permission were obtained to carry out the assessment, with the written consent to participate provided by the parents or legal guardians, and with the informed consent of the individuals concerned. In the online version, participants were asked for consent, and assessment began once this was obtained.

Participants were given information about the research aims, with a focus on the definition of loot boxes. The only instruction provided was to consider specifically this form of use, so as not to confuse it with other microtransactions that could skew the data (e.g., DLC, that is, specific additional content known to the player which added to video games after payment). In the online version, the instructions were specified alongside the research aims as a prior step to starting the questionnaire. In schools, they were stated in writing in the consent and given again orally on the day of data collection.

To guarantee that the questionnaire was correctly completed in the schools, two researchers participated in the data collection. The time required to complete the questionnaire varied by population. Adults took between 5 and 7 minutes to complete it, while in adolescents approximately 15 minutes was needed due to the difficulties inherent in administering tests in this age group (e.g., classroom settings, time between classes).

Data analysis

In order to characterize loot box use among the participants, descriptive analyses were first carried out. Subsequently, to examine the influence of different variables on this use, different statistical procedures were performed. Given that the normality assumption for the variable *spending on loot boxes* was not fulfilled, as shown with the Kolmogorov-Smirnov test ($p < 0.05$), the analysis was carried out using non-parametric tests. For comparisons between the adolescent and adult population, two different tests were carried out. First, a 2 x 2 table with Pearson's chi-square statistic (to find out whether differences exist in the need to buy loot boxes after seeing them advertised on online multimedia platforms; in the need to buy boxes after seeing them being opened on these platforms; in the perception of winning items and in the distress/guilt/loss of control on not obtaining the desired item); and, secondly, the Mann-Whitney U test (for loot box use and spending on new content).

Continuing with statistical analyses, Kruskal-Wallis H tests were applied to find out whether family socioeconomic level and hours gaming were related to loot box spending. Finally, binomial logistic regressions were performed to predict, on the one hand, the influence of the need to buy loot boxes after seeing them being opened on online multimedia platforms (independent/predictor variable) and their subsequent use (dependent/predicting variable); and, on the other hand, the influence of obtaining or not obtaining the desired item (independent/predictor variable) on feelings of guilt, distress and loss of control (dependent/predictor variables).

With respect to this last analysis, it was necessary to previously consider the goodness of fit of the model through the omnibus test (χ^2), Cox and Snell's R squared or Nagelkerke's R squared. Once assessed, we examined the β parameter and its significance, which provides information about whether the independent variable explains the dependent variable (Catena, Ramos & Trujillo, 2003).

Effect sizes were measured for each of the aforementioned tests: the phi (Φ) coefficient for Pearson's chi-square; Pearson's correlation coefficient (r) for the Mann-Whitney U test; the epsilon squared (ε^2) for the Kruskal-Wallis H test (Tomczak & Tomczak, 2014); and, finally, the B exponent for Binomial Logistic Regressions (Berlanga-Silvente & Vilà-Baños, 2014).

Data analysis was performed with IBM SPSS Statistics statistical package version 25, applying a level of statistical significance of $p = 0.05$.

Results

Sociodemographic data, together with the prevalence of loot box purchases, divided into adolescent and adult samples, are presented in table 1 and 2, respectively.

Regarding loot box use, it was found that players spent an average of €18.05 per month ($n = 167$; $SD = 36.30$), with statistically significant differences between adolescent and adult populations, ($U = 2737$, $p = 0.023$; $r = 0.21$), the former spending the most money ($M = 21.84$; $SD = 38.06$ vs $M = 15.04$; $SD = 34.75$). An increase in the purchase of

Table 1
Sociodemographic data and prevalence of loot box use consumption in the adolescent population

	Total sample (*N* = 266)	**Do not play video games** (*n* = 93.35%)	**Play video games** (*n* = 173.65%)	
			Do not buy loot boxes (*n* = 99; 57.22%)	**Buy loot boxes** (*n* = 74; 42.78%)
	M (SD)	***M (SD)***	***M (SD)***	***M (SD)***
Age	14.62 (1.84)	14.70 (1.63)	14.71 (1.97)	14.39 (1.91)
	N (%)	**n (%)**	**n (%)**	**n (%)**
Sex				
Male	151 (56.8)	13 (14)	69 (69.7)	69 (93.2)
Female	115 (43.2)	80 (86)	30 (30.3)	5 (6.8)
Marital status				
Single	266 (100)	–	–	–
Level of education				
Lower secondary	189 (71.1)	65 (69.9)	65 (65.7)	59 (79.7)
Higher secondary	69 (25.9)	26 (28)	30 (30.3)	13 (17.6)
Vocational training	8 (3)	2 (2.1)	4 (4)	2 (2.7)
Employed	0 (0)	–	–	–
Level of family income				
Low	6 (2.3)	3 (3.3)	3 (3.1)	–
Low-medium	48 (18.4)	14 (15.2)	18 (18.4)	16 (22.5)
Medium	154 (59)	66 (71.7)	53 (54.1)	35 (49.3)
Medium-high	44 (16.9)	9 (9.8)	19 (19.4)	16 (22.5)
High	9 (3.4)	–	5 (5.1)	4 (5.6)

Table 2
Sociodemographic data and prevalence of loot box use in the adult population

	Total sample (*N* = 209)	**Do not play video games** (*n* = 24; 11.48%)	**Play video games** (*n* = 185; 88.52%)	
			Do not buy loot boxes (*n* = 91; 49.19%)	***Buy loot boxes*** (*n* = 94; 50.81%)
	M (SD)	***M (SD)***	***M (SD)***	***M (SD)***
Age	25.17 (4.65)	23.63 (3.20)	25.95 (5.10)	24.82 (4.39)
	N (%)	**n (%)**	**n (%)**	**n (%)**
Sex				
Male	158 (75.6)	5 (20.8)	71 (78)	82 (87.2)
Female	51 (24.4)	19 (79.2)	20 (22)	12 (12.8)
Marital status				
Single	196 (93.8)	24 (100)	84 (92.3)	88 (93.6)
Married	13 (6.2)	–	7 (7.7)	6 (6.4)
Level of education				
Primary	1 (0.5)	–	–	1 (1.1)
Lower secondary	8 (3.8)	–	4 (4.4)	4 (4.3)
Higher secondary	46 (22)	3 (12.5)	18 (19.8)	25 (26.6)
Vocational training	40 (19.1)	–	16 (17.6)	24 (25.5)
University degree	69 (33)	12 (50)	32 (35.2)	25 (26.6)
Postgraduate	44 (21.1)	9 (37.5)	20 (22)	15 (16)
PhD	1 (0.5)	–	1 (1.1)	–
Employed	85 (40.9)	6 (25)	42 (46.7)	37 (39.4)
Level of family income				
Low	7 (3.4)	–	3 (3.3)	4 (4.3)
Low-medium	62 (30)	7 (29.2)	26 (28.9)	29 (31.2)
Medium	103 (49.8)	10 (41.7)	48 (53.3)	45 (48.4)
Medium-high	32 (15.5)	7 (29.2)	13 (14.4)	12 (12.9)
High	3 (1.4)	–	–	3 (3.2)

loot boxes when video game companies announced new content (skins, legendary weapons, etc.), was reported by 42.8% (n = 71) of gamers, increasing average spending to €43.90 (n = 68; SD = 51.41), with no differences across the different age groups, (U = 527, p = 0.679; r = 0.06).

In terms of the profiles, casual gamers (n = 67) spent a monthly average of €15.41 (SD = 42.43), regular gamers (n = 65) around €20.17 (SD = 33.75) and hardcore gamers (n = 31) €20.97 (SD = 29.01). It was not possible to determine whether content creators spent more on loot boxes given the small number of participants who identified as such (n = 4).

As for the need to buy loot boxes after seeing them advertised on online multimedia platforms, 37% (n = 60) of the participants reported experiencing this, with half of them (n = 30) making such a purchase. No significant differences were observed between the adolescent and adult samples, [χ^2 (1, N = 162) = 1.475; p = 0.25; Φ = 0.11]. Bank cards used for purchasing loot boxes were generally found that be the gamers' own in the case of adults, while belonging to parents or others in adolescent gamers. In the latter case, 97.2% (n = 70) reported that their parents/other people knew about the purchase.

Regarding the psychological and emotional aspects associated with the use of loot boxes, table 3 shows the variables assessed, together with the percentage and number of participants who experienced these feelings, and the statistical results of the differences between the age groups. Regarding this disparity, a greater ratio of adolescents reported having obtained the desired items through loot boxes (56% vs. 44%), while adults reported feeling greater guilt after purchasing (71% vs. 29%). No statistically significant differences were found for the loss of control and perceived distress variables.

In order to analyze whether the explored variables were linked to greater use, it was firstly examined whether a higher family socioeconomic level was associated with higher spending, with no significant differences found [χ^2 (4) = 6.798; p = 0.147; ε^2_R = 0.04]. Secondly, in relation to gamer profiles, it was examined whether those dedicating more hours a day to gaming spent more money on loot boxes, with no significant differences found [χ^2 (2) = 4.647; p = 0.098; ε^2_R = 0.03].

Regarding psychological and emotional effects, no differences were found between adults and adolescents in the need to purchase after seeing loot boxes opened on online multimedia platforms [χ^2 (1, N = 162) = 1.104; p = 0.293; Φ = 0.08]. Moreover, it was found that feeling this need did not predict the subsequent purchase [β (1) = -16.578; p = 0.997]. On the other hand, it was observed that not obtaining the desired item predicted feelings of distress and guilt in the players, while obtaining the desired item predicted greater feelings of loss of control among the participants (Table 4). To find out whether sociodemographic data acted as moderating variables, these were entered in the regression analyses as covariates. No statistical significance was found (p < 0.05), so it could be concluded that these variables have no influence on the dependent variable.

The goodness of fit of the model for these regressions, as expressed with the omnibus test, was statistically significant for the guilt variables [χ^2 (1, N = 164) = 14.296; p = 0.000; Cox and Snell R^2 = 0.083], perceived distress [χ^2 (1, N = 164) = 23.814; p = 0.000; Cox and Snell R^2 = 0.135] and loss of control [χ^2 (1, N = 164) = 9.083; p = 0.003; Cox and Snell R^2 = 0.054].

Table 3
Psychological and emotional aspects associated with loot box purchase

Psychological and emotional variables	%	*n*	Differences between adolescents and adults
Not obtaining the desired item	35.4	58	χ^2 (1, N = 164) = 20.633; p ≤ 0.05; Φ = 0.355
Guilt	45.5	75	χ^2 (1, N = 165) = 9.523; p = 0.002; Φ = 0.253
Loss of control	16.9	28	χ^2 (1, N = 166) = 2.323; p = 0.127; Φ = -0.135
Perceived distress	48.5	80	χ^2 (1, N = 165) = 1.937; p = 0.164; Φ = 0.108

Table 4
Binary logistic regression of obtaining the desired items by psychological and emotional aspects associated with loot box use

							95% CI for EXP (B)	
	B	E.T.	Wald	df	Sig.	Exp(B)	Lowest	Highest
Guilt	-1.265	0.343	13.581	1	0.000	0.282	0.144	0.553
Perceived distress	-1.676	0.363	21.379	1	0.000	0.187	0.092	0.381
Loss of control	1.276	0.430	8.812	1	0.003	3.581	1.543	8.313

Discussion

Given that the acquisition of loot boxes is a recent phenomenon, there is currently no solid theoretical base nor sufficient research to enable support or comparison of all results. However, the nature and characteristics of loot boxes have led to them being seen as games of chance (Griffiths, 2018), so that the results of research in this area could be extrapolated (e.g., on-site/online gambling, slot machines, etc.) and applied to this new modality, albeit with caution.

Following the stated aims, it was first decided to analyze the type of loot box use among gamers. Throughout this study, an attempt was made to explore this phenomenon, and approximately 43% of adolescents and 51% of adults assessed reportedly bought loot boxes. These findings are similar to the results of the studies by Zendle et al. (2019), and Kristiansen and Severin (2020), with loot box use of 41% in adolescents and 45% in adults, respectively. The data thus points to greater purchasing by the adult population. This age difference in loot box acquisition could be explained by bank card availability, with adolescents having less access to them because of the necessary permission of an adult, usually a family member, to enable the transaction.

Although adult players seemed to buy more loot boxes, it was surprising to find that teenagers spent more money on them. This result is consistent with the study by Brooks and Clark (2019), which observed that undergraduate students spent $7 more per month than adults. This spending on loot boxes may increase when video game companies announce new content, as suggested by the responses of participants in this study.

These data are especially relevant since they could be indicating a change in adolescent leisure and in their way of relating, with both being mediated by the use of ICTs (Espuny, González, Lleixà & Gisbert, 2011); this would translate into an increase in spending on online items (e.g., microtransactions, loot boxes, sports betting), rather than on other conventional activities such as, for example, going to the movies with friends or renting a football pitch (Megías, 2020). These new forms of leisure could become linked to the normalization of virtual behaviours, which could motivate a change in attitude towards gambling, de-stigmatizing its use and leading to it being considered one more means of peer group integration (Sirola, Kaakinen, Savolainen & Oksanen, 2019). Consequently, as occurs in other problematic behaviours (Herrero, 2003), adolescents may be less reluctant to buy loot boxes if their peers also buy them (King, Russell, Delfabbro & Polisena, 2020).

In addition to contributing to the sense of group inclusion, loot boxes generate other motivations that increase their acquisition, such as gaining an advantage over other players, getting valuable objects or the entertainment and uncertainty generated by the opening itself (Zendle et al., 2019). As regards the latter, channels on various online multimedia platforms, such as YouTube or Twitch, show content creators opening a vast number of loot boxes, and the recording are accessible to users. Seeing these contents could increase the desire to buy loot boxes (King et al., 2018; Zendle, 2020). Indeed, the descriptive results of this study show that a third of the assessed adolescent and adult gamers feel the need to buy them after seeing them on these platforms, and half end up making the purchase. These data show the potential importance of the media in attracting players, mainly through advertising. This fact is shown in the Report of the Observatory on the Protection of Online Gamblers (Informe del Observatorio de la Protección al Jugador Online) (Ministerio de Hacienda y Administraciones Públicas, 2013), which indicates that 13% of players find advertising or promotion of games to be an aspect that increases the need to keep playing them repeatedly.

Taking these implications into account, there is a clear need to discover what psychological and emotional consequences the purchase of loot boxes may have for adolescents and adults. Thus, we found that 16.9% of gamers analyzed show frequent feelings of loss of control. This result can be compared to data from the Ministerio de Hacienda y Administraciones Públicas (2015), which showed that 11.1% of online gamblers felt they had lost control at some point in their lives. In the adolescent population, loss of control could indicate that they are not yet fully prepared to face gambling situations, given that this is a stage of vulnerability in this difficult area (Carbonell & Montiel, 2016). Among adults, we found risk factors such as impulsivity, the use of alcohol or other substances, and sensation seeking (Dowling et al., 2017), which could explain the loss of control. This feeling could in turn lead them to experience negative emotions associated with distress and guilt (WHO, 2019). In our study, these two feelings are described by approximately half of the adolescents and adults who buy loot boxes. Therefore, although experiencing negative emotions after purchase should be a sufficiently aversive stimulus for gamers to stop using them, purchasing is actually boosted (Juniper Research, 2018). In adolescents, this fact could be related to the stronger perception of winning and being in control they feel in relation gambling (Moore & Ohtsuka, 1999).

Once loot box use of the participating gamers had been specified, the first objective also set out to examine certain variables that could be related to higher spending, including family socioeconomic level, number of gaming hours and seeing others open loot boxes on online multimedia platforms. Regarding the first variable, it was hypothesized that higher family socioeconomic level was associated with higher spending; no statistically significant differences were found, however. The results of the present study are consistent with those of Meduna et al. (2019) and Meduna et al. (2020), in which no relationship between the

level of income and greater loot box purchasing was found. A plausible explanation for this finding could be that loot boxes are affordable for the general population, regardless of their economic status, given that the cost of opening them can vary greatly. In the FIFA 21 video game, for example, loot boxes start at €1 (Vandal, 2020).

Regarding player profiles, the potential link between daily hours dedicated to gaming and loot box spending was explored. Contrary to expectations, no statistically significant differences were found between the gamer types. These results differ from those of Li et al. (2019), which established a positive association between gambling frequency and purchasing of loot boxes, or by King et al. (2020), in which the number of hours of play was linked to the spending in microtransactions within the Fortnite video game. Although the statistical data are not significant, qualitative observation of loot box use shows variation across the different profiles, with the gamers dedicating the most hours to video games, that is, regular and hardcore, spending approximately €5 more per month than casual gamers.

With regard to seeing content creators opening loot boxes on online multimedia platforms, it was hypothesized that feeling the need to open loot boxes after seeing them being opened on these platforms predicted greater purchasing. Contrary to expectations, however, the results of this study indicated that feeling this need did not predict the subsequent purchase. This result differs from the study by Zendle (2020), which established a positive link between spending on loot boxes and the visualization of loot box opening, both live and recorded. Although the results of this study were not statistically significant, we must point out that a section of gamers do feel such a need, and that half of them end up making the purchase. For this reason, more research is necessary to investigate the relationship between these variables.

The second and final objective was to analyze the effects of abusive loot box purchasing on the psychological and emotional health of gamers, specifically, the extent to which not obtaining the desired items in these loot boxes predicted higher levels of guilt, perceived distress, and loss of control. Regarding guilt and perceived distress, the results showed that not obtaining the wanted items could predict higher levels in both variables. These results are in line with those of Sleczka et al. (2020) and Oksanen et al. (2018), who found that gamers with excessive and/or problematic gambling presented high feelings of guilt and psychological distress after gaming. Everything seems to point to the fact that, due to the inherent characteristics of loot boxes, the chances of winning the desired item are minimal (Griffiths, 2018), with the money invested generally being greater than the value of the item obtained. This disparity between money spent and item obtained could arouse these associated negative emotions, in this case, guilt and perceived distress.

Finally, in relation to loss of control, it was found, unexpectedly, that obtaining the desired items could predict greater loss of control. This could be explained by the fact that obtaining the articles they wanted could trigger various cognitive and heuristic biases, such as the illusion of control (Chóliz, 2006) or prediction biases (Labrador & Mañoso, 2005), among others, making gamers believe that they will have the same chances of obtaining another item that they want when opening the next box.

Faced with the problem of gambling, different organizations are directing their efforts to reduce the impact of its use. Thus, entities such as the Spanish Foundation for Help against Drug Addiction (FAD), the Youth Council of the Principality of Asturias and the Junta de Extremadura with the Red Cross, among others, are launching a range of campaigns (e.g., 'It's obvious', 'You win' or 'Bet on yourself, don't gamble') in order to raise public awareness of the consequences and implications of onsite/online gambling, both on a psychological and social level. However, while all these adopted measures would be suitable for already consolidated gambling problems (such as slot machines addiction), this does not apply to loot boxes since, being such a novel phenomenon, they tend to go unnoticed.

The above campaigns could start taking loot boxes into account as a veiled form of gambling in the near future since the Ministerio de Consumo, more specifically the Dirección General de Ordenación del Juego, is formulating a draft law (Proyecto de Real Decreto) to regulate their use (Vélez, 2020). Discussions about reviewing the law to include loot boxes have been ongoing since 2018, during which time 15 European countries, including Spain, and the US state of Washington met at the Forum of European Regulators with the aim of regulating them (Pascual, 2018). Some countries have already done so, such as Belgium, Poland, China and Japan (Abarbanel, 2018; Griffiths, 2018; Schwiddessen et al., 2018), while others, such as the United Kingdom or France, are in the process.

It is necessary to take into consideration a series of limitations when interpreting the results presented in this study: (a) results should be generalized with caution since the sample size was small. It must be remembered that as it is such a specific microtransaction within video games, approximately half of the sample reported not doing this type of gambling; (b) this was a cross-sectional study limited to a certain period of time, so that it is not possible to establish causality across the variables assessed. Predictions using binomial logistic regressions must therefore be made carefully since the concept of prediction would only be purely statistical – it would be more accurate to speak about the relationship between the variables studied; (c) the self-report methodology has certain limitations. Firstly, given that there are no adequate instruments aimed at assessing this phenomenon, a self-elaborated questionnaire was designed that has not been

validated, so data reliability and validity may be reduced. The results must be interpreted within the framework of an exploratory study and not as a reflection of a precise reality. Secondly, the inherent disadvantages of self-reports must be considered (e.g., social desirability, acquiescence, response biases); and (d) regarding data gathering, an online version of the questionnaire was used in the adult sample, so that possible difficulties associated with this medium have to be considered (e.g., loss of contextual control, convenience sampling). For adolescents, data was collected in the schools during school hours, so that certain contextual variables could not be controlled (e.g., availability of students, privacy when responding).

All in all, the above limitations notwithstanding, it should be noted that, to the knowledge of the authors, this is the first empirical study carried out in Spain with the aim of examining the growing phenomenon of loot boxes. The preliminary results of this research reveal the use of loot boxes and its consequences, leading to a need for new lines of research to be opened on a subject that has aroused growing interest in other countries due to its relationship with gambling. Thus, as a proposal for future research in this field, it would be interesting to examine the prevalence of loot box use in a larger sample and to identify buyer profiles in order to develop prevention measures, as well as personalized interventions adapted to the needs of the users which include families and the educational community instead of focusing on gambling strategies.

Conclusions

This study highlights the need to continue researching this problem, one which is increasingly present in the world of video games. In conclusion and, in line with the results of previous studies, the present work found that (1) a section of gamers spent a significant amount of money on loot boxes; (2) adolescents frequently used loot boxes; (3) advertising new content on multimedia platforms could incentivize use; and (4) loot box use may cause negative emotions, including guilt, loss of control, and distress.

Conflict of interests

The authors declare no conflicts of interest.

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Annex 1. Questionnaire on the use of loot boxes in video games.

1. Age _____

2. Sex ◯ Male ◯ Female

3. Country of residence _____

4. Marital status ◯ Single ◯ Separated ◯ Married ◯ Widowed

5. Level of education ◯ Primary ◯ Lower secondary ◯ Higher secondary ◯ Vocational training ◯ University degree ◯ Postgraduate ◯ PhD

6. Are you currently employed? ◯ Yes ◯ No

7. What is your profession? _____

8. If currently working: What is your job? _____

9.How would you describe your family's socioeconomic level? ◯ Low ◯ Medium-low ◯ Medium ◯ Medium -high ◯ High

10. Do you play video games? ◯ Yes ◯ No

If the **answer to question 10** was **No** → **THIS IS THE END** OF THE QUESTIONNAIRE
If the **answer to question 10** was **Yes** → **PLEASE CONTINUE**

11. If you answered Yes to question 10, how many hours a day do you spend gaming

◯ < than 1 hour ◯ 5-6 hours
◯ 1-2 hours ◯ 7-8 hours
◯ 3-4 hours ◯ > 8 hours

12. Put an **X** in the respective box, considering these 4 options:

Video games	**I don't know this videogame**	**I know this videogame, but I don't play it**	**I know this videogame and have played it sometimes**	**I know this videogame and usually play it**
Fortnite				
Apex				
Dota 2				
Hearthstone				
Overwatch				
Heroes of the Storm				
FIFA				
Pro Evolution Soccer (PES)				
Clash Royale				
Counter Strike				
Brawl Stars				
League of Legends (Lol)				
Tom Clancy´S Rainbow Six Siegue				
Mario Kart Tour				

13. In the above video games (12), have you ever bought boxes, keys or envelopes? ◯ Yes ◯ No

If the **answer to question 13** was **No** → **THIS IS THE END** OF THE QUESTIONNAIRE
If the **answer to question 13** was **Yes** → **PLEASE CONTINUE**

14. How often do you buy boxes, keys or envelopes in these video games?

◯ Weekly ◯ Once every 6 months

◯ Monthly ◯ Once a year

15. Approximately how much money, in euros, would you say you have spent on this, considering the frequency given above?

_____€.

16. When new items, players, or characters become available, do you spend more money on boxes, keys or envelopes?

◯ Yes ◯ No

17. Approximately how much money, in euros, would you say you have spent on these new items/players/characters (16)?

_____€.

18. If you create content for video games on these platforms (Twitch, YouTube, Mixer), have you ever made a financial profit from it?

◯ Yes ◯ No

19. Have you ever felt the need to buy boxes, keys or envelopes after seeing them advertised on YouTube/Twitch/Mixer?

◯ Yes ◯ No

20. If you answered Yes to the previous question (19), have you ever bought them?

◯ Yes ◯ No

21. Was the bank card used for the purchase your own, did it belong to your parents or to someone else?

◯ Own

◯ My parents

◯ Other person (who?) _____

22. If the previous answer (21) was "my parents" or "other person", did they know that you used your card to buy these boxes, keys or envelopes?

◯ Yes ◯ No

23. Have you ever felt that you lost control after buying these boxes, keys or envelopes?
(For example: After buying a box/envelope/key, you bought another one straightaway)

◯ Never

◯ Almost never

◯ Sometimes

◯ Often

◯ Always

24. Did you get what you wanted when you bought these boxes, keys or envelopes?

◯ Yes ◯ No

25. Have you ever felt bad when you didn't get what you wanted?

◯ Yes ◯ No

26. Have you ever felt guilty about spending money on boxes, keys or envelopes?

◯ Yes ◯ No

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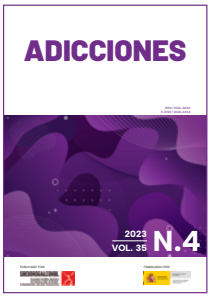

ORIGINAL

Hypothalamic-pituitary-adrenal axis dysregulation initiated by a binge drinking pattern, but not by acute alcohol intake, in female and male adolescents

Desregulación del eje hipotalámico-pituitario-adrenal iniciada por un patrón binge drinking*, pero no por el consumo agudo de alcohol, en mujeres y hombres adolescentes*

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Abstract

Excessive alcohol consumption is a worldwide public health problem, being adolescents and young adults the population most affected by this problem. The aim of this study was to clarify the effects of having a history of binge drinking (BD) and/or acute alcohol consumption on the stress response in female and male adolescents. Participants were 235 adolescents (143 females and 92 males). Cortisol, systolic and diastolic blood pressure (SBP and DBP), heart rate (HR) and perceived stress (PS) were evaluated in adolescents with different and similar blood alcohol concentrations (BAC). In Experiment 1, the effects of alcohol were studied separately in females and males because of differences in BAC. In Experiment 2, a direct comparison between sexes was carried out in a counterbalanced selection of participants with similar BAC. In Experiment 1, females receiving alcohol showed an increase in cortisol and HR, and binge drinkers displayed higher HR than refrainers. Male refrainers receiving alcohol showed higher HR, and binge drinkers showed higher cortisol and SBP than refrainers. In Experiment 2, similar results were observed and sex differences were evident, with males showing higher cortisol and SBP, and lower PS than females. In conclusion, the normal response of the adolescent HPA axis to alcohol consumption is an increase in cortisol levels in females, as well as HR in both sexes. In addition, a history of BD is associated with HPA axis dysregulation, which is manifested by higher values of cortisol (independently of sex), SBP in male and HR in female healthy adolescents.

Keywords: binge drinking, alcohol, stress response, adrenal-pituitary-hypothalamic axis, adolescents

Resumen

El consumo excesivo de alcohol es un problema de salud pública mundial, siendo los adolescentes y jóvenes adultos la población más afectada. El objetivo de este estudio fue esclarecer los efectos de una historia *binge drinking* (BD) y/o del consumo agudo de alcohol sobre la respuesta de estrés en mujeres y hombres. Participaron 235 adolescentes (143 mujeres y 92 hombres). Se evaluaron cortisol, presión arterial sistólica y diastólica (PAS y PAD), frecuencia cardiaca (FC) y estrés percibido (EP). En el experimento 1, los efectos del alcohol fueron estudiados separadamente en mujeres y hombres debido a diferencias en la concentración de alcohol en sangre (CAS). En el experimento 2, una selección balanceada de mujeres y hombres con similar CAS permitió su comparación. En el experimento 1, las mujeres que recibieron alcohol mostraron un incremento de cortisol y FC, y las *binge drinkers* mostraron mayor FC que las abstemias. Los hombres abstemios que recibieron alcohol mostraron mayor FC y los *binge drinkers* tuvieron niveles más altos de cortisol y PAS que los abstemios. En el experimento 2, se observaron resultados similares y diferencias de sexo, mostrando los hombres niveles más altos de cortisol y PAS, y menos EP que las mujeres. En conclusión, la respuesta normal del eje HPA adolescente al consumo de alcohol refleja un incremento de cortisol en mujeres, así como de FC en ambos sexos. Además, una historia de consumo BD está asociada con una desregulación del eje HPA, manifestado con niveles más altos de cortisol (independientemente de sexo), PAS en varones y FC en mujeres, adolescentes sanos.

Palabras clave: consumo intensivo de alcohol, alcohol, respuesta de estrés, eje hipotalámico-pituitario-adrenal, adolescentes

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Excessive alcohol consumption is a worldwide public health problem, and adolescents and young adults are those most affected by this problem in Spain and other countries. Most of this population develop a pattern of alcohol consumption known as binge drinking (BD), which has been defined by the National Institute on Alcohol Abuse and Alcoholism (NIAAA, 2004) as a drinking pattern in which the blood alcohol concentration (BAC) rises to 0.8 g/L or higher. This consumption pattern consists of the ingestion of large amounts of alcohol in a short period of time (two hours), followed by a period of abstinence that can vary from one week to a month (Parada et al., 2011; Vinader-Caerols & Monleón, 2019). The prevalence of BD in Spain is high: 32.3% of Spanish students from 14 to 18 years old admitted to this type of consumption in the previous 30 days at the time of completing a recent survey (Observatorio Español de las Drogas y las Adicciones, 2020). This pattern is commonly associated with acute impairment of motor coordination and cognitive functioning, and its continuation during adolescence predicts an atypical cortisol stress response in young adulthood (Hagan et al., 2019).

Although alcohol is often consumed to alleviate stress (Keyes, Hatzenbuehler, Grant & Hasin, 2012), it activates some brain stress systems and can be a stressor itself (Becker, 2017). Study of the interactions between biological stress systems and alcohol consumption has focused on the hypothalamic-pituitary-adrenal (HPA) axis (Weera & Gilpin, 2019) and the main stress hormone, cortisol (Hellhammer & Schubert, 2012), which is used as a biochemical marker in stress research (González-Cabrera, Fernández-Prada, Iribar-Ibabe & Peinado, 2014). In light of this, there is a need for studies that evaluate HPA axis dysfunction, since this is the main mediator of the short-term effects of alcohol on the body and a potential pathway by which alcohol exerts long-term effects on biological systems (Hagan et al., 2019).

Growing evidence suggests that alcohol directly stimulates the HPA axis and has effects on glucocorticoid receptors in the extra-hypothalamic, limbic forebrain and medial prefrontal cortex circuits that contribute to the development of alcohol use disorders (AUDs) and their progression, chronicity, and relapse risk (Blaine & Sinha, 2017). The acute effect of alcohol on stress hormones has been studied through the voluntary consumption of alcohol by humans and animals, which increases cortisol and corticosterone (King, Munisamy, de Wit & Lin, 2006; Lu & Richardson, 2014). Acute alcohol has a stimulating effect on the HPA axis, resulting in an initial increase in cortisol output in adolescents (Magrys, Olmstead, Wynne-Edwards & Balodis, 2013). The literature also shows that BD during adolescence predicts an atypical cortisol stress response in young adulthood: in the short term, subjects with a history of BD exhibit significantly higher basal levels of cortisol, indicating an over-regulated HPA axis (Wemm et al., 2013); in contrast, in the long term, BD during adolescence is associated with a significantly lower cortisol stress response in young adulthood (Hagan et al., 2019). Studies evaluating the relationship between acute alcohol consumption and history of BD have associated BACs below 0.8 g/L in consumers with a history of low-to-moderate drinking (not binge drinkers) with an increased response of the HPA axis (higher blood cortisol levels); however, a reduced HPA axis response has been related to these BACs when subjects are binge drinkers (Allen, Lee, Koob & Rivier, 2011; Blaine & Sinha, 2017; Waltman, Blevins, Boyd & Wand, 1993; Zimmermann et al., 2004).

Cortisol also facilitates an increase in cardiovascular activity, raising the heart rate and blood pressure (Hagan et al., 2019; Ulrich-Lai & Herman, 2009). Several studies have demonstrated that an acute intake of alcohol (Bau et al., 2011; Sher, Bartholow, Peuser, Erickson & Wood, 2007; Vinader-Caerols, Monleón, Carrasco & Parra, 2012) or a sustained BD pattern (King, Houle, de Wit, Holdstock & Schuster, 2002) increases heart rate (HR) in young adults. It has also been noted that frequent BD during adolescence can increase the risk of developing high blood pressure (BP) in young adults, regardless of other risk factors such as a smoking habit or obesity (Hayibor, Zhang & Duncan, 2019).

Perceived stress has been associated with the risk of alcohol misuse in adolescents and young adults (Tavolacci et al., 2013). In line with this, students with a marked BD pattern of alcohol consumption have been found to score almost twice as high as the general adult population on the stress perception scale (Bidwal, Ip, Shah & Serino, 2015).

Experimental results of research performed with only one sex are sometimes extrapolated to both sexes. Sex should be considered an important biological variable in basic and preclinical research before results are applied to both men and women (Lee, 2018). Thus, we decided to compare the sexes with respect to the effects of alcohol on the HPA axis according to the history of BD. With this goal in mind, two experiments were designed: the first one analysed separately females and males with different BAC; and the second one evaluated a selection of females and males with similar BAC, which allowed the effect of gender to be studied.

Taking into consideration the aforementioned published evidence, there is a need to systematically examine the effects of acute alcohol consumption on the HPA axis and autonomic arousal. Such experimental studies in the adolescent population are scarce, which is why the main objective of this work was to clarify the effects of a history of BD and/or acute alcohol consumption on the functionality of the HPA axis (cortisol) and other variables of the stress response (HR, BP and PS) in female and male adolescents. Another goal was to provide further evidence about the changes triggered in the HPA axis and the stress

response in healthy adolescents by BD when initiated from an early age, specifically cortisol levels, HR, BP and PS. These changes are of great importance, as they can contribute to the transition from BD to the compulsive loss of control over alcohol intake seen in severe AUDs. For the mentioned goals, a sample of binge drinkers (with a history of BD) and non-binge drinkers (refrainers and occasional consumers without history of BD) was selected and they received a control drink or an alcoholic drink as experimental conditions.

We have recreated the conditions in which BD usually occurs –i.e., a risk alcohol consumption (38.4 g) in a short time (20 min)– and have measured the functionality of the HPA axis (cortisol levels). We expected to see an increase in cortisol levels, HR, BP and PS in the female and male adolescents without a history of BD, due the natural reaction of the stress response after acute alcohol intake. On the other hand, the participants with a history of BD only (no acute alcohol intake) would have higher basal levels of the variables evaluated, due to over-regulation of the HPA axis. Finally, in accordance with the literature, we assumed that our participants with a one-year history of BD would display lower values (cortisol levels, HR, BP and PS) after acute alcohol consumption.

Method

Participants

Two hundred and thirty-five healthy 18-19-year-old adolescent students (143 females and 92 males) at the University of Valencia (Spain) participated in this study. The volunteers were recruited by means of a self-report of their alcohol consumption habits and general health. Participants were classified as refrainers if they had never previously consumed alcoholic drinks (pure refrainers) or had consumed very sporadically (occasional consumers) (see Table 1); or as consumers of alcohol with a BD pattern according to the NIAAA criteria for Spain (López-Caneda et al., 2014) if they had drunk six or more SDUs (standard drink unit) of distilled spirits (alcohol content ≥ 40% vol.), according to the BD habits referred by the subjects, in a row in the case of males and five or more SDUs in a row in the case of females on a minimum of three occasions per month during the previous 12 months (Vinader-Caerols & Monleón, 2019).

Strict inclusion/exclusion criteria were applied to the sample selection. The following inclusion criteria were applied: age 18–19 years old; a healthy body mass index (mean of 22.88 ± 0.30 in males and 21.44 ± 0.23 in females) and good health (reporting a state of emotional and physical well-being, without major medical problems or diagnosed pathology). The exclusion criteria were as follows: taking medication; a history of mental disorders (diagnosed by a health professional according to DSM criteria); an irregular sleep pattern (non-restorative sleep and/or an irregular schedule); having consumed, even sporadically, any drug (apart from alcohol or tobacco) or having a history of substance abuse, including caffeine (our criterion: ≤ 2 stimulant drinks/day), tobacco (our criterion: ≤ 10 cigarettes/day) or alcohol; having suffered from an intense stressful event within a year of the experiment and having first degree relatives with history of alcoholism. A telephone interview of approximately 15 min was conducted with each subject to confirm the information provided in the self-report and to arrange the date and time of the test. Participants were told to follow their normal sleep pattern and their usual meal routine, and have lunch at one hour before the experimental session.

The data of the female participants' menstrual cycle were registered in the self-report and telephone interview, and the subject's cycle phase was considered in the test to counterbalance this variable in each group, checking that the number of females in each cycle phase was similar in every group. No females taking contraceptives were included in the study.

Tests and Apparatus

The activity of the HPA-axis was measured by analysing salivary cortisol levels using a competitive solid phase radioimmunoassay test. Salivette® was employed as a hygienic method of collecting saliva by means of a synthetic swab specially designed for cortisol determination. Three saliva samples were collected from all our subjects: one prior to consumption (COR0'), a second 20 min (COR20') after drink intake, and a third 50 min (COR50') after intake, considering that high levels of BAC are observed at the 20-50 min interval (Vinader-Caerols, Talk, Montañés, Duque & Monleón, 2017a; Vinader-Caerols, Duque, Montañés & Monleón 2017b). The samples were frozen at −18°C until they were sent to the laboratory for analysis by a competitive solid phase radioimmunoassay (tube coated) with the commercial kit Coat-A-Count C (DPC, Siemens Medical Solutions Diagnostics, Los Angeles, CA, USA). Assay sensitivity was 0.5 ng/mL (1.38 nmol/L). Data were expressed in nanomolar units (nmol/L). All the samples from each participant were analysed in the same trial; the within and inter assay variation coefficients were all below 5.5%. Salivary cortisol levels were determined at Echevarne Analysis Laboratory, Valencia (Spain).

The Alcohol Use Disorders Identification Test (AUDIT) (Saunders, Aasland, Babor, de La Fuente & Grant, 1993) was employed to measure a problematic use of alcohol among the subjects. The AUDIT consists of 10 questions that evaluate the quantity and frequency of alcohol intake and alcohol-related behaviours and consequences. It uses a range of 0-40 points, in which a score of 8 or more indicates a problematic use of alcohol. A higher score is related to a greater severity of problematic drinking.

A digital automatic blood pressure monitor (M10-IT, OMRON, Spain) was employed to measure systolic BP (SBP), diastolic BP (DBP) and HR in all the subjects.

Participants were assessed by means of the Perceived Stress Scale (PSS-14) (Cohen, Kamarck & Mermelstein, 1983), a standardized self-report questionnaire composed of 14 items designed to measure stress and which evaluate how unpredictable, uncontrollable and overloaded respondents consider their lives to have been in the previous month. A higher direct score on the PSS-14 indicates a higher level of PS. All subjects completed the standardized Spanish version of PSS-14. The internal consistency of this scale was calculated for our data, obtaining a Cronbach's alfa coefficient of .836 for females and .860 for males in Experiment 1, and .861 in Experiment 2 (females and males together).

An alcoholmeter (Alcoquant® 6020, Envitec, Germany) was employed to measure BAC of each participant before and after (20 min and 50 min) intake of a beverage (control drink or alcoholic drink).

Procedure

The experimental procedure was approved by the Research Ethics Committee of the University of Valencia (Certification number: H1485172642673; approved on July 7th, 2017), and was in accordance with the Helsinki Agreement. All participants provided written informed consent to take part in the study. According to their drinking pattern (refrainers and binge drinkers) and the beverage received (control drink or alcoholic drink), subjects were assigned to one of four experimental conditions: Refrainers-Control (R-Co) (pure refrainers-refreshment intake); Refrainers-Alcohol (R-A) (occasional consumers-alcoholic drink intake); Binge Drinkers-Control (BD-Co) (subjects with a history of BD-refreshment intake) or Binge Drinkers-Alcohol (BD-A) (subjects with a history of BD-alcoholic drink intake).

Participants were instructed to abstain from any intake of alcohol, caffeinated beverages, drugs or medication and strenuous exercise for 24 h before the experimental session, and to refrain from eating and smoking at least 1 h prior to the session. At the beginning of the session BAC was measured in all subjects using the alcoholmeter to ensure that they had not consumed alcohol. In addition, a problematic use of alcohol among the BD subjects was assessed using the AUDIT test (mean score: 6.72 ± 0.33 in females and 7.69 ± 0.47 in males). None of the subjects was found to be alcohol-dependent. All the participants provided a first saliva sample for cortisol determination (COR0') just before the intake. Each subject received a flavoured refreshment (lime, orange or cola, without caffeine) contained in cans of 330 ml, alone or mixed (according to the experimental group) with distilled drinks with an alcohol content of 40% vol. (vodka or gin) in risk doses of 120 ml (equivalent to 38.4 g of alcohol). The subjects were instructed to consume their drink within a period of 20 min, during which they ate a light snack (the same for all participants) and the beverages were always consumed in the presence of a research assistant. After finishing the drink, all subjects rinsed their mouths with water and underwent a 20-min waiting period.

After this 20-min waiting interval, the second saliva sample was collected for cortisol determination (COR20') and BAC was measured in all the subjects. Subsequently, we measured SBP, DBP and HR (all were recorded 3 times and their average calculated) and perception of stress by means of the PSS-14. Finally, the participants provided a third saliva sample (COR50') after which BAC was measured once again. The duration of the experimental protocol was around 2 hours and all measurements were performed between 16:00 and 18:00h, during descendent BAC. Members of the groups that received alcohol remained on the premises until their alcohol concentration dropped to legal limits for driving.

The BAC was 0.00 g/L for females and males before the alcoholic drink, and the mean was 0.53 ± 0.12 g/L for females and 0.34 ± 0.01 g/L for males after drinking. It is important to point out that, although all subjects consumed the same amount of alcohol, the statistical differences in BAC between females and males did not allow a direct comparison between sexes; however, it was possible to study the effects of alcohol within each sex (Experiment 1). A counterbalanced selection of females and males with similar BAC 0.38 ± 0.01 g/L was carried out to study the gender factor (Experiment 2). A summary of the characteristics of the study population (represented in its entirety in Experiment 1) is presented in Table 1.

Statistical Analyses

Data for females and males were analysed separately, as BAC was statistically different in the two groups (Experiment 1), and together when BAC was similar (Experiment 2). The data were subjected to parametric analysis after confirming they met the criteria for normality and homogeneity of variances. Statistically significant differences were established at $p < .05$ and the statistical power was calculated using alpha = 0.05. A repeated measures ANOVA was performed for cortisol COR20' and COR50' (COR0' measure was not included in this ANOVA because the first register of cortisol was taken before treatment –alcohol or control drink– was administered). A one-way ANOVA was performed for each measure of stress response (SBP, DBP, HR and PS) for females and males, separately (Experiment 1) or together (Experiment 2). Each analysis contained the between-subject factors 'Drinking Pattern' (refrainers and binge drinkers) and 'Treatment' (control drink and alcohol) as independent variables. Factor 'Sex' was also included as a third between-subject factor in Experiment 2. When any

Table 1
Characteristics of the study population (Experiment 1)

	Refrainers (occasional consumers) (n = 38)			Binge Drinkers (n = 130)		
	Females (n = 21)	**Males** (n = 17)	**Females + Males** (n = 38)	**Females** (n = 81)	**Males** (n = 49)	**Females + Males** (n = 130)
Age at first alcohol consumption	15.809 ± 0.255	16.058 ± 0.326	15.921 ± 0.185	14.654 ± 0.125&&	14.714 ± 0.157&&	14.676 ± 0.097++
Mean number of occasions per month	0.565 ± 0.146	0.482 ± 0.155	0.528 ± 0.097	2.666 ± 0.084&&	2.612 ± 0.119&&	2.646 ± 0.068++
Mean number of drinks per occasion	2.952 ± 0.381	2.0 ± 0.332	2.562 ± 0.246	6.259 ± 0.232&&	7.265 ± 0.325&&	6.638 ± 0.194++
Mean number of BD episodes per month	NA	NA	NA	2.666 ± 0.084	2.612 ± 0.119	2.646 ± 0.068
Mean duration of BD pattern (in months) until the beginning of experiment	NA	NA	NA	11.333 ± 0.262	11.326 ± 0.267	11.330 ± 0.084
	Refrainers (pure refrainers + occasional consumers) (n = 105)			**Binge Drinkers (n = 130)**		
	Females (n = 62)	**Males** (n = 43)	**Females + Males** (n = 105)	**Females** (n = 81)	**Males** (n = 49)	**Females + Males** (n = 130)
Mean number of stimulant drinks: Coke, tea, or coffee / day	1.048 ± 0.160	0.953 ± 0.188	1.009 ± 0.121	0.950 ± 0.100	0.714 ± 0.148	0.861 ± 0.084
Smoker: no / yes	62/0	43/0	105/0	61/20	42/7	83/27
Stressful event in the last year: no / yes	47/15	38/5	85/20	63/18	44/5	87/23
Nervous: no / yes	45/17	34/8	79/25	73/8	42/5	97/13
Good Sleep: no / yes	6/56	6/37	12/93	9/72	4/45	13/97
Sports activity: no / yes	53/9	39/4	92/13	66/15	36/13	82/28
Breakfast: no / yes	9/53	7/36	16/89	13/68	5/44	18/92

The results are expressed as number or mean ± SEM for Refrainers and Binge Drinkers. NA: not applicable.
&& $p < .001$ *vs* occasional consumers in the same sex. ++ $p < .001$ *vs* occasional consumers.

interaction between these factors was statistically significant, pairwise comparisons were carried out by Student's t-test. All correlations of measures of stress response registered at 20 minutes of treatment were explored. All analyses were performed using the 'SPSS' Statistics software package, version 26 for Windows (IBM, 2019).

Results

Experiment 1: Effects of a risk dose of alcohol on cortisol, BP, HR, and PS in female (BAC: 0.53 ± 0.12 g/L) and male (BAC: 0.34 ± 0.01 g/L) adolescents with or without a history of BD

A summary of descriptive statistics and results for the main factors in stress responses in Experiment 1 is presented in Table 2.

Cortisol (COR0', COR20' and COR50')

The factor Drinking Pattern in COR0' was not statistically significant, neither in females ($F_{(1,79)} = 0.122$, $p = .727$) nor in males ($F_{(1,53)} = 2.308$, $p = .135$).

COR20' and COR50': The repeated measures ANOVA showed that Cortisol was statistically significant in females ($F_{(1,77)} = 16.842$, $p = .001$) and males ($F_{(1,51)} = 32.155$, $p = .001$), showing a significant decrease of COR50' with respect to COR20' in both females and males (Figure 1A). The interactions Cortisol X Drinking Pattern, Cortisol X Treatment, and Cortisol X Drinking Pattern X Treatment were not statistically significant, neither in females ($F_{(1,77)} = 0.790$, $p = .377$), ($F_{(1,77)} = 0.472$, $p = .494$), ($F_{(1,77)} = 0.014$, $p = .907$), respectively; nor in males ($F_{(1,51)} = 1.313$, $p = .257$), ($F_{(1,51)} = 0.823$, $p = .369$), ($F_{(1,51)} = 0.551$, $p = .461$), respectively.

The main factor Drinking Pattern in females was not found to be statistically significant ($F_{(1,77)} = 0.629$, $p = .430$), while the factor Treatment was statistically significant ($F_{(1,77)} = 6.222$, $p = .015$), with higher cortisol levels detected in the alcohol groups (see Table 2). The interaction Drinking Pattern X Treatment was not statistically significant ($F_{(1,77)} = 0.739$, $p = .393$).

The main factor Drinking Pattern in males was statistically significant ($F_{(1,51)} = 4.071$, $p = .049$), with binge drinkers showing higher cortisol levels than refrainers (see Table 2); while Treatment was not statistically significant ($F_{(1,51)} = 2.151$, $p = .149$). The interaction Drinking Pattern X Treatment was not significant ($F_{(1,51)} = 0.932$, $p = .339$).

Table 2
Summary of descriptive statistics and results for COR, SBP, DBP, HR and PS (Experiment 1)

	FEMALES (BAC: 0.53 ± 0.12 g/L)					
	Drinking Pattern			Treatment		
	Refrainers	Binge Drinkers	Statistical Power[1]	Control	Alcohol	Statistical Power[1]
COR (n = 81)	4.59 ± 0.34	4.77 ± 0.37	.982	4.18 ± 0.29	5.45 ± 0.42+	.982
SBP (n = 143)	106.45 ± 1.32	104.49 ± 1.09	.219	104.58 ± 1.14	106.24 ± 1.25	.137
DBP (n = 143)	68.96 ± 0.97	68.14 ± 0.85	.068	68.78 ± 0.81	68.16 ± 0.94	.088
HR (n = 138)	72.36 ± 1.20	77.05 ± 1.11#	.656	72.93 ± 1.01	77.55 ± 1.33*	.659
PS (n = 137)	24.67 ± 0.93	24.08 ± 0.86	.109	23.26 ± 0.83	25.50 ± 0.94	.409
	MALES (BAC: 0.34 ± 0.01 g/L)					
	Drinking Pattern			Treatment		
	Refrainers	Binge Drinkers	Statistical Power[1]	Control	Alcohol	Statistical Power[1]
COR (n = 55)	5.89 ± 0.54	7.88 ± 0.84$	1.000	7.37 ± 0.57	6.11 ± 0.85	1.000
SBP (n = 86)	116.90 ± 1.71	122.39 ± 1.60&	.314	118.87 ± 1.81	121.00 ± 1.51	.069
DBP (n = 86)	67.32 ± 1.37	71.06 ± 1.37	.424	68.00 ± 1.45	70.92 ± 1.59	.218
HR (n = 89)	74.04 ± 1.82	71.25 ± 1.42	.332	72.04 ± 1.49	73.15 ± 1.77	.080
PS (n = 92)	18.39 ± 1.15	20.00 ± 1.15	.122	18.20 ± 1.05	20.50 ± 1.27	.148

Notes. Salivary cortisol concentrations (COR). Systolic (SBP) and Diastolic (DBP) Blood Pressure. Heart Rate (HR). Stress Perception (PS). Not applicable (NA). The results are expressed as mean ± SEM. 1The Statistical Power is calculated using alpha = 0.05. Females: + $p < .05$ increase of cortisol in Alcohol group *vs* Control group. # $p < .05$ increase of HR in Binge Drinkers ***vs*** Refrainers. * $p < .05$ increase of HR in Alcohol group *vs* Control group. Males: $ $p < .05$ increase of cortisol in Binge Drinkers *vs* Refrainers. & $p < .05$ increase of SBP in Binge Drinkers *vs* Refrainers.

Blood Pressure (SBP and DBP)

SBP: In females, neither the main factors –Drinking Pattern ($F_{(1,139)} = 1.379$, $p = .242$) and Treatment ($F_{(1,139)} = 0.993$, $p = .321$)– nor their interaction ($F_{(1,139)} = 1.491$, $p = .224$) were statistically significant. In males, Drinking Pattern was statistically significant ($F_{(1,82)} = 4.892$, $p = .03$), with binge drinkers displaying higher SBP than refrainers (see Table 2). Neither the factor Treatment nor the interaction Drinking Pattern X Treatment were statistically significant ($F_{(1,82)} = 0.660$, $p = .419$; $F_{(1,82)} = 0.256$, $p = .615$; respectively).

DBP: In females, neither the main factors –Drinking Pattern ($F_{(1,139)} = 0.165$, $p = .685$) and Treatment ($F_{(1,139)} = 0.253$, $p = .616$)– nor their interaction ($F_{(1,139)} = 0.729$, $p = .395$) were statistically significant. In males, Drinking Pattern was not statistically significant ($F_{(1,82)} = 3.143$, $p = .08$), and neither were the factor Treatment or the interaction Drinking Pattern X Treatment ($F_{(1,82)} = 2.062$, $p = .155$; $F_{(1,82)} = 0.323$, $p = .572$; respectively).

Heart Rate (HR)

In females, the factor Drinking Pattern was statistically significant ($F_{(1,134)} = 5.625$, $p = .019$), with binge drinkers showing higher HR than refrainers (see Table 2). The factor Treatment was also statistically significant ($F_{(1,134)} = 5.588$, $p = .02$) among females, with those who drank alcohol presenting higher HR (see Table 2). The interaction Drinking Pattern X Treatment was not statistically significant ($F_{(1,134)}$

Figure 1A
Salivary cortisol concentrations mean at 20 minutes (COR20') and 50 minutes (COR50') after treatment in females and males separately (Experiment 1). # p < .05 vs COR20'

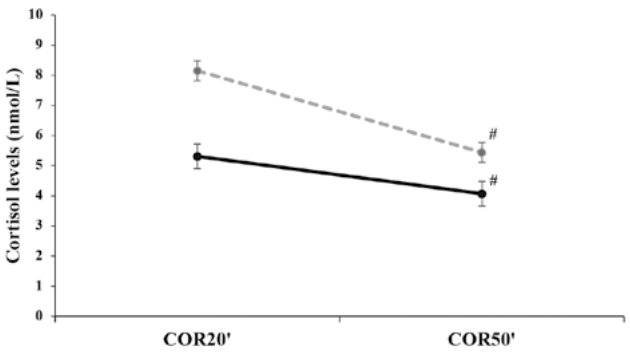
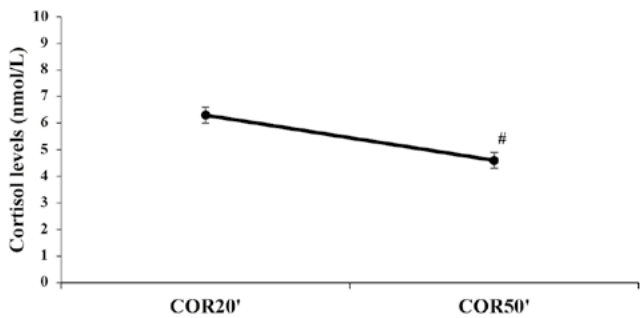
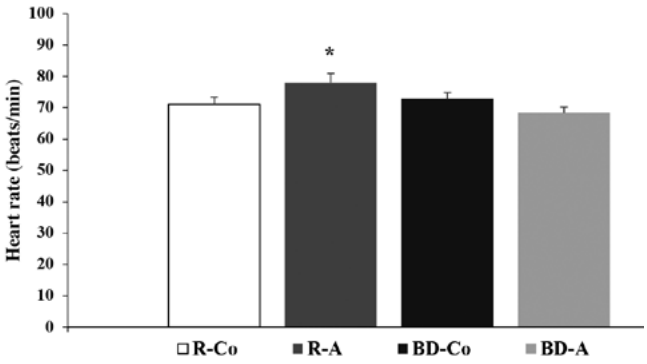


Figure 1B
Salivary cortisol concentrations mean at 20 minutes (COR20') and 50 minutes (COR50') after treatment in females and males together (Experiment 2). # p < .05 vs COR20'



= 0.016, p = .898). In males, neither Drinking Pattern ($F_{(1,85)}$ = 2.319, p = .132) nor Treatment ($F_{(1,85)}$ = 0.605, p = .439) were statistically significant, while the interaction Drinking Pattern X Treatment was ($F_{(1,85)}$ = 4.877, p = .03), with refrainers receiving alcohol presenting a higher HR than all the other groups (R-Co, BD-Co and BD-A) (Figure 2).

Figure 2
*Heart Rate (HR) in males in Experiment 1. Values are expressed as means (+ SEM). R-Co: Refrainers-Control; R-A: Refrainers-Alcohol; BD-Co: Binge Drinkers-Control; BD-A: Binge Drinkers-Alcohol. * p < .05 vs R-Co, BD-Co, and BD-A*



Perceived Stress (PS)

Neither the main factors –Drinking Pattern and Treatment– nor their interaction was statistically significant in females (Drinking Pattern: $F_{(1,133)}$ = 0.508, p = .477; Treatment: $F_{(1,133)}$ = 3.057, p = .083; Interaction: $F_{(1,133)}$ = 0.140, p = .709) or in males (Drinking Pattern: $F_{(1,88)}$ = 0.633, p = .428; Treatment: $F_{(1,88)}$ = 1.687, p = .197; Interaction: $F_{(1,88)}$ = 0.030, p = .862).

Correlations between measures

Positive correlations 20 min after treatment were detected in females, demonstrating a mutual increase of the following variables: SBP and DBP (r = 0.617, p = .001), and DBP and HR (r = 0.222, p = .046). Positive correlations were also found in males between COR20' and SBP (r = 0.344, p = .013), SBP and DBP (r = 0.417, p = .002), and DBP and HR (r = 0.434, p = .001).

Experiment 2
Effects of a risk dose of alcohol on cortisol, BP, HR and PS in female and male adolescents (BAC: 0.38 ± 0.01 g/L) with or without a history of BD

A summary of descriptive statistics and results for the main factors in stress responses in Experiment 2 is presented in Table 3.

Cortisol (COR0', COR20' and COR50')

In COR0', neither the factor Drinking Pattern ($F_{(1,92)}$ = 1.6470, p = .203) nor the factor Sex ($F_{(1,92)}$ = 0.057, p = .811) were statistically significant. Similarly, the interaction Drinking Pattern X Sex was not statistically significant ($F_{(1,92)}$ = 0.004, p = .948).

COR20' and COR50': The repeated measures ANOVA showed that Cortisol was statistically significant ($F_{(1,88)}$ = 20.764, p = .001), showing a significant decrease of COR50' with respect to COR20' (Figure 1B). None of the possible interactions between Cortisol, Drinking Pattern, Treatment and Sex was statistically significant (ps > .05 in all cases).

The main factors Drinking Pattern and Treatment were not found to be statistically significant ($F_{(1,88)}$ = 2.584, p = .112; and $F_{(1,88)}$ = 0.460, p = .500; respectively); while Sex was significant ($F_{(1,88)}$ = 4.538, p = .036), with higher cortisol levels detected in male groups (see Table 3). The interaction Drinking Pattern X Treatment was also statistically significant ($F_{(1,88)}$ = 4.492, p = .037), with binge drinkers who received control drink showing higher cortisol levels than the rest of the subjects (Figure 3). The rest of interactions were not statistically significant (Drinking Pattern X Sex: $F_{(1,88)}$ = 0.116, p = .735; Treatment X Sex: $F_{(1,88)}$ = 3.578, p = .062; and Drinking Pattern X Treatment X Sex: $F_{(1,88)}$ = 1.370, p = .245).

Table 3
Summary of descriptive statistics and results for COR, SBP, DBP, HR and PS (Experiment 2)

	FEMALES AND MALES (BAC: 0.38 ± 0.01 g/L)								
	Drinking Pattern			Treatment			Sex		
	Refrainers (n = 48)	Binge Drinkers (n = 48)	Statistical Power[1]	Control (n = 48)	Alcohol (n = 48)	Statistical Power[1]	Females (n = 48)	Males (n = 48)	Statistical Power[1]
COR	4.94 ± 0.37	5.37 ± 0.55	.995	5.67 ± 0.45	5.23 ± 0.50	.995	4.77 ± 0.32	6.14 ± 0.58#	.995
SBP	113.75 ± 1.54	113.60 ± 1.86	.051	114.29 ± 1.80	113.06 ± 1.61	.098	106.52 ± 1.27	120.83 ± 1.44*	1.000
DBP	68.70 ± 0.92	68.83 ± 1.25	.051	69.02 ± 0.90	68.52 ± 1.22	.062	68.08 ± 0.93	69.45 ± 1.23	.144
HR	72.12 ± 1.55	74.93 ± 1.46	.278	70.33 ± 1.41	76.72 ± 1.56$	.875	75.16 ± 1.38	71.89 ± 1.69	.357
PS	21.93 ± 1.14	23.12 ± 1.28	.083	21.77 ± 1.22	23.29 ± 1.19	.100	24.39 ± 1.07&	20.66 ± 1.29	.636

Notes. Salivary cortisol concentrations (COR). Systolic (SBP) and Diastolic (DBP) Blood Pressure. Heart Rate (HR). Stress Perception (PS). Not applicable (NA). The results are expressed as mean ± SEM. [1]The Statistical Power is calculated using alpha = 0.05. # p < .05 increase of COR ***vs*** females. * p < .05 increase of SBP *vs* females. $ p < .05 increase of HR in Alcohol group ***vs*** Control group. & p < .05 increase of PS *vs* males.

Blood Pressure (SBP and DBP)

SBP: No significant results were observed for the main factors Drinking Pattern ($F_{(1,88)}$ = 0.006, p = .939) or Treatment ($F_{(1,88)}$ = 0.418, p = .520), but the factor Sex was statistically significant ($F_{(1,88)}$ = 56.639, p = .001), with males showing higher SBP than females (see Table 3). The interaction Drinking Pattern X Sex was statistically significant ($F_{(1,88)}$ = 3.675, p = .05), with male binge drinkers displaying higher SBP than their female counterparts (Figure 4). The interactions Drinking Pattern X Treatment ($F_{(1,88)}$ = 1.273, p = .262), Treatment X Sex ($F_{(1,88)}$ = 0.640, p = .426) and Drinking Pattern X Treatment X Sex ($F_{(1,88)}$ = 2.123, p = .149) were not statistically significant.

DBP: Significant results were not obtained for the main factors Drinking Pattern ($F_{(1,88)}$ = 0.007, p = .935), Treatment ($F_{(1,88)}$ = 0.106, p = .746), and Sex ($F_{(1,88)}$ = 0.802, p = .373). The interactions Drinking Pattern X Treatment ($F_{(1,88)}$ = 3.816, p = .054), Drinking Pattern X Sex ($F_{(1,88)}$ = 3.305, p = .072), Treatment X Sex ($F_{(1,88)}$ = 0.851, p = .359), and Drinking Pattern X Treatment X Sex ($F_{(1,88)}$ = 0.027, p = .871) were not statistically significant.

Heart Rate (HR)

HR was not statistically significant for the main factors Drinking Pattern ($F_{(1,88)}$ = 1.915, p = .170) and Sex ($F_{(1,88)}$ = 2.590, p = .111), but it was for the factor Treatment ($F_{(1,88)}$ = 9.902, p = .002), with higher HR observed among the subjects that received alcohol during the experiment (see Table 3). The interaction Drinking Pattern X Treatment was not statistically significant ($F_{(1,88)}$ = 3.442, p = .067), but Drinking Pattern X Sex was ($F_{(1,88)}$ = 4.245, p = .042), with higher HR in female binge drinkers *vs* the rest of the groups (Figure 5). The rest of interactions were not statistically significant (Treatment X Sex: $F_{(1,88)}$ = 0.318, p = .574; Drinking Pattern X Treatment X Sex: $F_{(1,88)}$ = 1.342, p = .250).

Figure 3
*Salivary cortisol concentrations (females and males together) in Experiment 2. Values are expressed as means (+ SEM). R-Co: Refrainers-Control; R-A: Refrainers-Alcohol; BD-Co: Binge Drinkers-Control; BD-A: Binge Drinkers-Alcohol. * p < .05 vs R-Co*

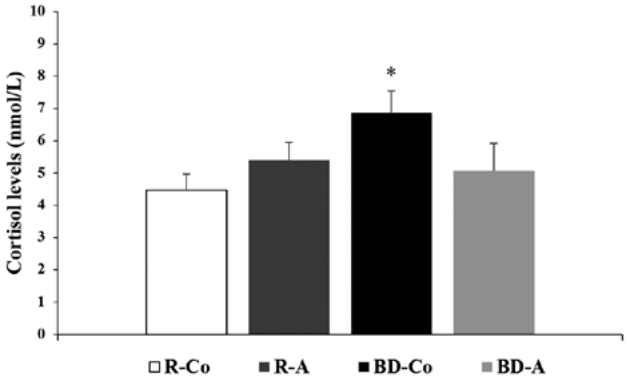
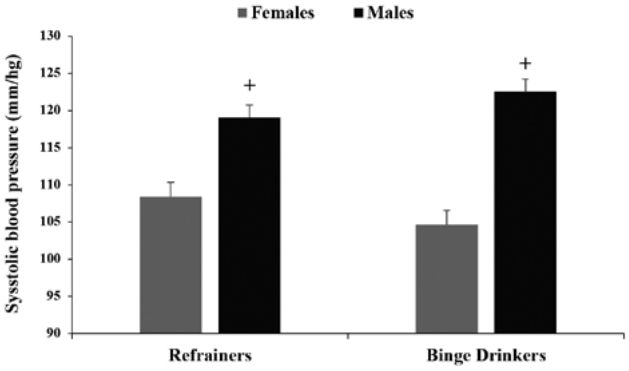


Figure 4
Systolic blood pressure (SBP) in females and males in Experiment 2. Values are expressed as means (+ SEM). + p < .05 vs females



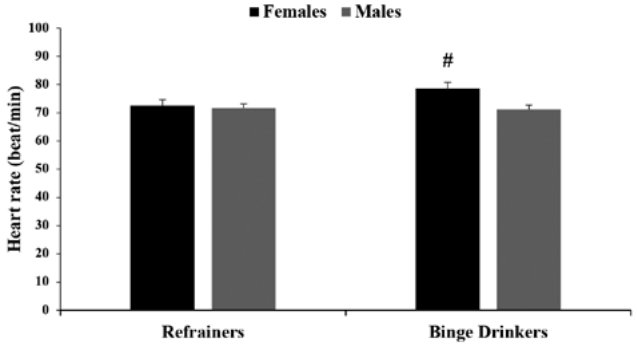
Perceived Stress (PS)

The results obtained for PS were not statistically significant for Drinking Pattern ($F_{(1,88)}$ = 0.488, p = .487) or Treatment ($F_{(1,88)}$ = 0.800, p = .373), but was for factor Sex ($F_{(1,88)}$ = 4.811, p = .031), with females obtaining higher PS scores than males (see Table 3). None of the interactions was statistically significant (Drinking Pattern X Treatment: $F_{(1,88)}$ = 0.523, p = .472; Drinking Pattern X Sex: $F_{(1,88)}$ = 0.025, p = .874; Treatment X Sex: $F_{(1,88)}$ = 0.109, p = .742; Drinking Pattern X Treatment X Sex: $F_{(1,88)}$ = 1.243, p = .268).

Correlations between measures

Positive correlations 20 min after treatment were detected between the following variables: COR20' and SBP (r = 0.314, p = .002), SBP and DBP (r = 0.493, p = .001), and DBP and HR (r = 0.235, p = .021).

Figure 5
Heart Rate (HR) in females and males in Experiment 2. Values are expressed as means (+ SEM). # p < .05 vs all groups



Discussion

This study was designed to clarify the effects of a history of BD and/or the effects of acute alcohol on the functionality of the HPA axis (cortisol) and other variables of the stress response (HR, BP, and PS) in female and male adolescents. Our hypothesis was that there would be an increase of cortisol levels, HR, BP, and PS in the participants without a history of BD, due to the normal stress response to acute alcohol consumption (Hagan et al., 2019; King et al., 2006; Lu & Richardson, 2014; Ulrich-Lai & Herman, 2009). Our results partly support this hypothesis: cortisol and HR were higher in females who drank alcohol during Experiment 1 and HR was higher among participants of both sexes who drank alcohol during Experiment 2. The outcome of our investigation is in line with previous research showing alcohol to have a direct influence on the HPA axis by elevating HPA hormone levels (King et al., 2006; Lu & Richardson, 2014; Richardson, Lee, O'Dell, Koob & Rivier, 2008). Although a significant correlation between cortisol and heart rate was not observed in our study, the increase in cardiovascular activity in our female subjects could be due to the rise in HPA hormone levels (cortisol), since such a finding has been reported by other groups (Bau et al., 2011; Sher et al., 2007).

Our results after acute alcohol intake are related to a normal stress response system, in the line of other studies (King et al., 2006; Lu & Richardson, 2014; Richardson et al., 2008). Furthermore, our findings show that a history of BD (not the effects of acute alcohol intake) can also have a significant effect, as some variables of the stress response system appeared to already be dysregulated due to past BD episodes. In this way, our results in Experiment 1 revealed higher HR levels in BD females, and higher basal cortisol and SBP in BD males. In Experiment 2, basal cortisol levels were higher in BD participants who received control drink in comparison to the other groups. This suggests that adolescents with a history of BD (without considering any acute alcohol intake) have higher cortisol levels due to over-regulation of the HPA axis (Wemm et al., 2013). Therefore, we have achieved the other major goal of our study, as we have demonstrated that BD triggers changes in the HPA axis and in the stress response in healthy adolescents who began a consumption pattern BD in adolescence. In contrast to our findings, other studies have reported lower values of cortisol levels, HR, BP, and PS in subjects with a history of BD engaging in acute alcohol consumption, arguing that the response system is regulated by a sustained history of BD (e.g., Hagan et al., 2019; Orio et al., 2018). We did not observe such a finding in our study, perhaps because our participants had not reached that point of regulation: i.e., a one-year history of BD was not long enough for the aforementioned regulation (lower levels in stress response measures) to be achieved.

The interactions that we observed are in line with the rest of the results in our study, pointing to an increased HR in male refrainers who drank alcohol, as reported in previous research (Bau et al., 2011; Sher et al., 2007; Vinader-Caerols, et al., 2012). This result, observed in Experiment 1, can be interpreted as a phenomenon of tolerance among male binge drinkers, as their HR did not increase when they drank alcohol. In Experiment 2, the interaction Drinking Pattern X Treatment led to higher cortisol le-vels in the BD group receiving control drink, compared to the other groups. This confirms the over-regulation of the HPA axis basal state reported in a previous study (Wemm et al., 2013), and provides evidence that the BD pattern triggers alterations in the HPA axis, independently of sex.

The main goal of Experiment 2 was to study the sex factor directly. Considering that the variations in cortisol over time observed in our study are in the same direction in both sexes (lower levels of COR50' than COR20' in females and males separately, as well as in both sexes together), the main sex difference was the higher levels of cortisol in males, perhaps because salivary cortisol increases are up to twice as high in males as in females. This sex difference is supported by the literature: the typical mean response in males has been shown to range from 200 to 400% with respect to baseline, while changes from 50 to 150% are usually seen in females (Kudielka, Hellhammer & Wüst, 2009). Another sex difference was observed in the case of BP, with SBP proving to be higher in males than in females. According to previous research, the BP of young females is typically lower than that of young males, even among healthy normotensive people (Joyner, Wallin & Charkoudian, 2016). In addition, SBP was higher among our male BD participants in comparison to the female BD and refrainers groups. Finally, our female participants showed higher levels of stress (PS) than males and the female BD group showed higher HR than their male counterparts, as reported by other studies (Anbumalar, Dorathy, Jaswanti, Priya & Reniangelin, 2017; Hogan, Carlson & Dua, 2002).

Several studies have reported that cortisol facilitates an increase in cardiovascular activity, raising heart rate and blood pressure (Hagan et al., 2019; Ulrich-Lai & Herman, 2009). The findings of our study partly support this issue through positive correlations between cortisol levels and cardiovascular activity (COR20' and SBP).

Among the limitations of this study, it must be mentioned that we measured cortisol levels after treatment, but we did not measure them early in the morning, when levels are highest because of the circadian rhythm of cortisol variations (Weitzman et al., 1971; Yamanaka, Motoshima & Uchida, 2019). Nevertheless, the saliva cortisol samples were within the normal range of basal values (2.7586-8.2758 nmol/L) at the time they were taken (16:00h-18:00h) (Aardal & Holm, 1995). In addition, a bigger sample would

have been desirable in the second experiment to back up the results obtained in females and males with similar BAC. Finally, longitudinal studies are necessary in the future in order to study the long-term effects of HPA axis dysregulation.

Considering all the results, and despite the aforesaid limitations, our study infers that:

a) A normal HPA axis in adolescents reacts to alcohol consumption by increasing cortisol levels in females, as well as HR in both sexes, as a normal reaction of the stress response system.

b) Higher values of cortisol (independently of sex), HR in females and SBP in males are observed in subjects with a history of BD maintained at least one year, even if they are healthy teenagers, due to an emerging dysregulation in the HPA axis. However, these changes are not sufficient for diagnosing a disease.

c) The main sex differences were found in cortisol, SBP and PS, with males showing higher levels of cortisol and SBP, and lower PS than females.

d) Our results contribute to a better knowledge of the changes related to alcohol consumption that occur at this stage of life (late adolescence) and may help to devise strategies to prevent the changes in the HPA axis triggered by BD, considering the sex factor and thus implementing more effective prevention programs aimed at this risk group.

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Conflict of interests

The authors declare they have no conflict of interest.

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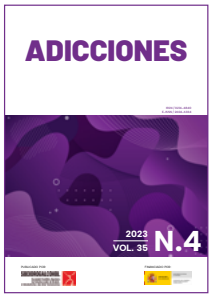

ORIGINAL

Patients' satisfaction and experience in treatment with opioid substitution therapy in Spain. The PREDEPO study

Satisfacción y experiencia de pacientes en tratamiento con sustitutivos opioides en España. Estudio PREDEPO

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Abstract

The aim of this study was to compare patients' satisfaction, experience, objectives, and opinion based on their current opioid substitution therapy (OST) (buprenorphine/naloxone (B/N) or methadone). The PREDEPO study is an observational, cross-sectional, multicentric study performed in Spain. Adult patients diagnosed with opioid use disorder (OUD) receiving OST were included. They were asked to fill in a questionnaire regarding their current OST. A total of 98 patients were enrolled (B/N: 50%, methadone: 50%). Mean age was 47 ± 8 years old and 80% were male. Treatment satisfaction was similar between groups. The most frequently reported factor for being "very/quite satisfied" was "being able to distribute the dose at different times throughout the day" (44% B/N vs. 63% methadone; p = .122). A significantly lower proportion of patients in the B/N group versus the methadone group reported that having to collect the medication daily was "very/quite annoying" (19% vs. 52%, p = .032). Treatment objectives reported by the majority of patients were similar between groups ("not feeling in withdrawal anymore", "reduce/definitely stop drug use", "improve my health", and "stop thinking about using daily") except for "not having money problems anymore" (73% B/N vs. 92% methadone; p = .012). These results suggest there are several unmet expectations regarding current OST. There is a need for new treatments that reduce the burden of OUD, avoid the need for daily dosing, and are less stigmatizing which in turn could improve patient management, adherence and, quality of life.

Key words: opioid use disorder, patient satisfaction, opioid substitution therapy, methadone, buprenorphine/naloxone

Resumen

El objetivo es comparar la satisfacción, experiencia, objetivos y opinión de los pacientes con trastorno por consumo de opioides (TCO) en base a su tratamiento sustitutivo de opioides (TSO) actual (metadona o buprenorfina/naloxona (B/N)). El estudio PREDEPO es un estudio observacional, transversal, multicéntrico desarrollado en España que incluyó pacientes adultos, diagnosticados de TCO y en TSO, quienes contestaron una encuesta sobre su tratamiento actual. Se incluyeron 98 pacientes (B/N:50%, metadona:50%): edad media de 47 ± 8 años y el 80% varones. A nivel de la satisfacción con su tratamiento, los resultados fueron similares entre grupos. El factor "muy/bastante satisfactorio" que se reportó con mayor frecuencia fue "poder repartir las dosis en varios momentos del día" (44% B/N vs. 63% metadona; p = ,122). Se encontraron diferencias significativas en "tener que recoger la medicación diariamente" donde una menor proporción en el grupo B/N contestaron "muy/bastante molesto" versus el grupo metadona (19% vs. 52%, p = ,032). Los objetivos reportados por la mayoría de los pacientes fueron similares entre grupos ("no sentir más síndrome de abstinencia", "disminuir o dejar definitivamente mi consumo de drogas", "mejorar mi estado de salud" y "dejar de pensar en consumir todos los días") excepto en "no tener más problemas de dinero" (72% B/N vs. 92% metadona; p = ,012). Estos resultados evidencian que existen expectativas no cubiertas con los TSO actuales y la necesidad de nuevos tratamientos que disminuyan la carga de la enfermedad, eviten la necesidad de una dosificación diaria y reduzcan el estigma, mejorando así el manejo del paciente, su adherencia y calidad de vida.

Palabras clave: trastorno por consumo de opioides, satisfacción de pacientes, sustitutivo de opioides, metadona, buprenorfina/naloxona

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Opioid use disorder (OUD) is a major chronic and complex health problem, characterised by repeated opioid use and frequent relapse (American Psychiatric Association, 2013; Dematteis et al., 2017), potentially leading to medical, social and economic problems for both the individual and society (Canadian Agency for Drugs and Technologies in Health, 2013).

OUD affects millions of people worldwide (World Health Organization, 2018). In the European Union, the prevalence in 2018 of high-risk opioid use among adults was estimated at 1.3 million users (European Monitoring Centre for Drugs and Drug Addiction, 2020) and it is estimated that over 100,000 people die each year as a result of opioid use (World Health Organization, 2018). The prevalence of high-risk opioid use among adults in Spain is estimated to be around 2.2% per 1,000 inhabitants (European Monitoring Centre for Drugs and Drug Addiction, 2019) and in 2017, more than 1,000 deaths due to opioid overdose were reported (Salazar et al., 2020).

OUD is associated with a high rate of morbidity and mortality, with infectious diseases and psychiatric disorders being the most frequent comorbidities (González-Saiz et al., 2011; Mateu, Astasls & Torrens, 2005; Roncero et al., 2016). Many long-term opioid users in Europe engage in polydrug use, so OUD is also associated with drug-related problems such as overdose, crime, unemployment, social exclusion and disadvantage, among others (European Monitoring Centre for Drugs and Drug Addiction, 2020).

Overcoming addiction and reintegrating into society usually requires long-term treatment (Dematteis et al., 2017; European Monitoring Centre for Drugs and Drug Addiction, 2020; Observatorio Vasco de Drogodependencias, 2004; Roncero et al., 2017). Although there are abstinence-based treatments for OUD, pharmacotherapy with opioid substitution treatments (OST) and psychosocial support is recommended (Dematteis et al., 2017), with methadone and a sublingual buprenorphine and naloxone (antagonist) combination (B/N) being the most widely used OST in Spain (Roncero et al., 2015). Both treatments reduce opioid craving, thus allowing better control of psychiatric and organic comorbidities. In addition, they are associated with a reduction in the rate of infectious diseases and hospitalizations, increasing overall survival (Koehl, Zimmerman & Bridgeman, 2019; Sordo et al., 2017; Volkow, Frieden, Hyde & Cha, 2014).

However, lack of adherence and treatment abandonment are common (Calvo et al., 2018; Strang et al., 2017), with a high percentage of patients restarting treatment (European Monitoring Centre for Drugs and Drug Addiction, 2019). Methadone and B/N are daily dosage treatments and require frequent visits by patients to addictive behaviour units or pharmacy services to collect the medication. For many patients, this is a stigmatizing process which limits their freedom and quality of life, making work, vacations, and other everyday activities difficult. Patients with OST thus increasingly want more free time that they can spend on normalizing their lives (Harris & McElrath, 2012; Treloar & Valentine, 2013). To find the most suitable pharmacological strategy, it is important to take into account not only the condition of the patients but also their satisfaction and/or experiences when establishing a treatment. Evaluating patients' experience, as captured by Patient Reported Experiences Measures (PREMs) is thus becoming increasingly important. PREMs assess the perception, satisfaction and/or experience of patients regarding the care, treatment and support received and are therefore an indicator of received care quality and an essential element for medicine and patient-centred research (Alonso-Caballero & Ferrer-Forés, 2017).

Satisfaction with treatment and with the medical care received reflects the degree to which a patient's experience matches their expectations (Iftikhar et al., 2011). Knowing the degree of patient satisfaction is an increasingly used indicator to achieve therapeutic success and improve the quality of life of patients (Florek, Wang & Armstrong, 2018). The objective of this study was therefore to compare the satisfaction, experience, objectives and opinion of patients with OUD based in their current OST (methadona or B/N).

Method

Study design

The PREDEPO study is an observational, cross-sectional and multicentre study carried out in six addiction care centres belonging to the Spanish National Health System in six Autonomous Communities of Spain. This study was approved by the Euskadi Drug Research Ethics Committee (CEIm-E) (Basque Country, Spain) and was carried out in accordance with the Declaration of Helsinki principles regarding medical research on human beings.

Study population

Adult patients were recruited who were diagnosed with OUD according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013), and on OST treatment (with prescription) for OUD, and who provided written informed consent. Patients unable to read and/or understand the questions in the patient diary or informed consent were not included, as were those patients with evident mental dysfunction that could lead to a lack of willingness or inability of the patient to comply with study procedures.

Data Collection

To avoid bias in information gathering, patients were recruited consecutively as they came to their consultation

appointments until each treatment group was completed. Data collection was carried out between September and October 2020. The researchers from each centre completed a data collection notebook (DCN) retrospectively with sociodemographic and clinical data obtained from the clinical records and computerized records of the centre. For their part, patients filled in a cross-sectional patient diary with questions to give their opinion and experiences regarding their OST.

Design of the DCN and patient diary

A scientific committee was formed which included the president of the Spanish Scientific Society for the Study of Alcohol, Alcoholism and Other Drug Dependencies (SOCIDROGALCOHOL), an expert in health psychology, management and evaluation, and a patient with OUD worked with two members who were expert in health outcomes research on the design of the DCN and the patient diary. In addition, the OUD patient helped in adapting the language of the questions in the patient diary to make them easy to understand for participants.

The patient's diary consisted of fixed-choice questions and various Likert scales. To reveal patients' objectives, a graded Likert Scale with four response options was used, with results grouped according to the level of agreement ["not at all" and "not really" vs. "yes, quite a bit" and "yes, absolutely"]. To determine patient satisfaction with possible situations associated with their OST at the time of the study, a five-step Likert scale was used, with results grouped according to the degree of satisfaction ["very annoying" and "quite annoying" vs. "neither annoying nor satisfying" vs. "quite satisfactory" and "very satisfactory"]. Continuous Likert scales (1-10) were used to determine the degree of patient satisfaction with the care received from the professionals, as well as with the OST at the time of the study and the assessment of its efficacy, with 1 the least positive and 10 the most positive value.

Objectives of the study

The main objective of this study was to compare the satisfaction and experience of patients with OUD based on their current OST (methadone or B/N). The secondary objectives were to determine, based on treatment group, the objectives and opinions of the patients, as well as their sociodemographic and clinical characteristics.

Sample size

The results of this article were obtained from an extension to the main PREDEPO study analysis, which is why the entire methodology, including design, the variables included and sample size was taken from the same study. The necessary sample size for the main PREDEPO analysis was calculated with 10% precision and 95% confidence to estimate the percentage of patients who would be willing to change treatment. This estimate was based on the study by Bendimerad, Kosim and Trojak (2019), in which 53.2% of patients undergoing treatment for OUD were willing to change or modify their treatment. According to these data, 96 patients would be required, to which an additional 10% would be added to cover possible losses, making a total of 106 patients.

Statistical analysis

For the descriptive study, absolute and relative frequencies were calculated for qualitative variables, as well as means and standard deviations for quantitative variables and the 95% confidence interval (CI = 95%) for the result of the main objective. For the inferential analysis comparing the characteristics of the patients according to whether they received methadone or B/N, Pearson's chi-square test was applied on qualitative variables, with Fisher's exact test used in the case of non-compliance with any of its requirements, and Student's T test was used with quantitative variables, assuming normality on exceeding 30 cases per group. The type I error threshold for accepting or rejecting null hypotheses was 5%. Calculations were carried out with R 4.0.4 software.

Results

Study population

Of the 99 patients recruited from the six participating centres, 98 were analyzed (50% on methadone treatment and the other 50% on B/N). One patient on naltrexone was excluded from the analysis for non-compliance with the study selection criteria.

Sociodemographic and clinical characteristics

The sociodemographic and clinical characteristics of the patients included in the study analysis are shown in table 1 and 2, respectively. Patient mean age was 46.9 ± 8.4 years and 79.6% of the participants were men. The rate of HCV infection was found to be significantly lower in patients with B/N compared to those on methadone (2.04% with B/N vs. 22.45% with methadone; p = .002). In addition, the percentage of patients with children was significantly higher in the group with B/N, compared to the methadone group (50.0% with B/N vs. 26.5% with methadone; p = .022) Statistically significant differences were also observed in relation to years in OUD treatment (10.4 ± 7.6 years with B/N vs. 16.7 ± 9.3 years with methadone; p <.001) and the start of OST at the time of the study (4.6 ± 4.2 years with B/N vs. 9.7 ± 8.6 years with methadone; p <.001), as well as in the collection of medication frequency (p <.001), with a higher proportion of patients on methadone collecting the medication with a frequency less than one month (89.8%) compared to patients on B/N (23.40%), most of whom (42.6%) collected the medication monthly (Figure 1).

Table 1
Sociodemographic characteristics

Variable	TOTAL (n=98)	Methadone (n=49)	B/N (n=49)	*p*-value
Age, years				
Mean (DE)	46.9 (8.4)	46.7 (7.7)	47.0 (9.2)	.873
Sex, n (%)				
Male	78 (79.6)	40 (81.6)	38 (77.6)	.616
Female	20 (21.4)	9 (18.4)	11 (22.4)	
Marital status, n (%)				
Single	49 (50.0)	26 (53.1)	23 (46.9)	
Married or with partner	31 (31.6)	16 (32.6)	15 (30.6)	.576
Separated or divorced	18 (18.4)	7 (14.3)	11 (22.5)	
Stable family situation, n (%)				
Has children	37 (37.8)	13 (26.5)	24 (49.0)	**.022**
Stable home situation	70 (71.4)	36 (73.5)	34 (69.4)	.655
Living arrangements, n (%)				
With parents	36 (36.7)	18 (36.7)	18 (36.7)	
With partner	29 (29.6)	16 (32.7)	13 (26.5)	
Alone	27 (27.6)	13 (26.6)	14 (28.7)	.898
Shared flat	2 (2.0)	1 (2.0)	1 (2.0)	
Other	4 (4.1)	1 (2.0)	3 (6.1)	
Level of education, n (%)				
Primary school	54 (55.1)	31 (63.3)	23 (46.9)	
Secondary school	34 (34.7)	13 (26.5)	21 (42.9)	.333
No schooling	7 (7.1)	4 (8.2)	3 (6.1)	
University studies	3 (3.1)	1 (2.0)	2 (4.1)	
Employment, n (%)				
On benefits	48 (49.0)	24 (49.0)	24 (49.0)	
Unemployed	22 (22.4)	13 (26.5)	9 (18.4)	
In work	21 (21.4)	9 (18.4)	12 (24.5)	.666
Unpaid work	3 (3.1)	2 (4.1)	1 (2.0)	
Other	4 (4.1)	1 (2.0)	3 (6.1)	

Note. B/N: buprenorphine/naloxone; SD: standard deviation.

Patient satisfaction with their OST

Figure 2 shows the results of patient satisfaction with possible situations associated with their OST. The factor most frequently reported in both treatment groups as "very or quite satisfactory" was "being able to distribute the doses at different times throughout the day" (44.4%, 12/27 with B/N vs. 63.0%, 17/27 with methadone; p =. 122). The factors that patients reported more frequently as "very annoying" or "quite annoying" in the B/N group was "being able to not take the medication from time to time in order to use illicit substances in other places", "being able to sell the treatment" and "feeling ashamed/stigmatized by having my treatment administration supervised daily". In contrast, the factor that methadone group patients most frequently reported as "very annoying" or "quite annoying" was "having to pick up the medication daily", followed by "having to pick up the treatment frequently (daily, weekly)" and "feeling ashamed/stigmatized by having my treatment administration supervised daily". The only variable where significant differences were found between groups was "having to pick up the medication daily" where a smaller proportion of B/N group patients answered "very annoying" or "quite annoying" compared to the methadone group (19.0%, 4/21 vs. 52.2%, 12/23 p = .032, respectively).

In both treatment groups, patients scored above 8/10 when asked about satisfaction with their OST at the time of the study (8.9/10 with B/N vs. 8.4/10 with methadone; p = .107). Assessment by B/N patients were more positive compared to those of methadone patients both for care received from health professionals (9.2/10 with B/N vs. 8.7/10 with methadone; p = .048), and OST efficacy at the time of the study (9.2/10 with B/N vs. 8.5/10 with methadone; p = .014) (Table 3).

Patient experience with their OST

No statistically significant differences were found between treatment groups when analyzing the experiences of patients with their treatment, although almost twice as many patients with methadone indicated that their circumstances/conditions made it difficult to take their treatment (14.9% with B/N vs. 28.6% with methadone). Most patients in both treatment groups indicated that they never, or rarely, forgot to take their medication (77.1%

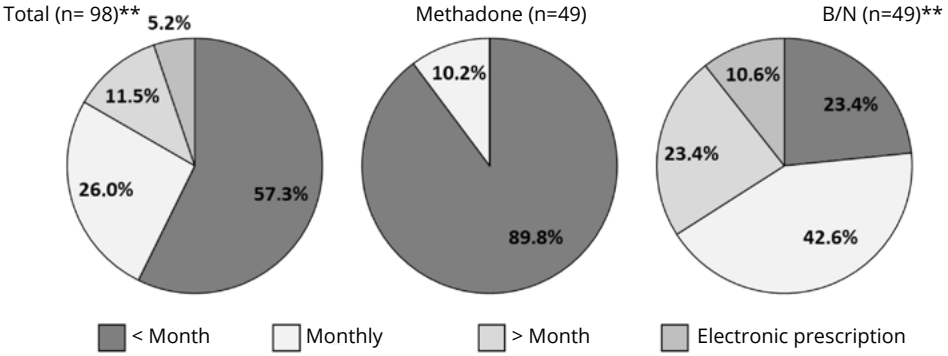
Table 2
Clinical characteristics

Variable	TOTAL (n=98)	Methadone (n=49)	B/N (n=49)	*p*-value
Onset of opioid use, years				
Mean (SD)	21.4 (11.5)	23.1 (11.2)	19.6 (11.6)	.148
Missing values	7	4	3	
Start of first OST, years				
Mean (DE)	13.5 (9.0)	16.7 (9.3)	10.4 (7.6)	**<.001**
Start of current OST, years				
Media (DE)	7.3 (7.2)	9.7 (8.6)	4.6 (4.2)	**<.001**
Nº of previous treatments, n (%)				
1 or more	56 (57.1)	25 (51.0)	31 (63.3)	.640
None	42 (42.9)	24 (49.0)	18 (36.7)	
Stage of current OST, n (%)				
Maintenance	87 (88.8)	45 (91.8)	42 (85.7)	.337
Reduction	11 (11.2)	4 (8.2)	7 (14.3)	
Changes in dosage over the last year, n (%)				
No	70 (71.4)	32 (65.3)	38 (77.6)	.180
Yes	28 (28.6)	17 (34.7)	11 (22.4)	
Dependence on other substances, n (%)				
No dependence	11 (11.2)	3 (6.1)	8 (16.3)	.110
Dependence on 1 or more substances	87 (88.8)	46 (93.9)	41 (83.7)	
Substances, n (%)#				
Tobacco	72 (73.5)	39 (79.6)	33 (67.4)	.170
Cocaine	43 (43.9)	26 (53.1)	17 (34.7)	.067
Cannabis	21 (21.4)	13 (26.5)	8 (16.3)	.218
Anxiolytics	15 (15.3)	9 (18.4)	6 (12.2)	.400
Alcohol	14 (14.3)	6 (12.2)	8 (16.3)	.564
Stimulants	6 (6.1)	3 (6.1)	3 (6.1)	1.000
Organic pathology, n (%)#				
HIV	19 (19.3)	9 (18.4)	10 (20.4)	.798
HCV	12 (12.2)	11 (22.5)	1 (2.0)	**.002**
Lung disorder	9 (9.2)	5 (10.2)	4 (8.2)	1.000
HBV	6 (6.1)	5 (10.2)	1 (2.0)	.111
Heart disease	1 (1.0)	0 (0.0)	1 (2.0)	1.000
Other	10 (10.2)	4 (8.2)	6 (12.2)	.487
Psychiatric comorbidities, n (%)#				
Personality disorder	26 (26.5)	13 (26.5)	13 (26.5)	1.000
Major depressions	18 (18.4)	6 (12.2)	12 (24.5)	.118
Schizophrenia/psychosis	14 (14.3)	5 (10.2)	9 (18.4)	.248
ADHD	5 (5.1)	4 (8.2)	1 (2.0)	.362
Other	7 (7.1)	4 (8.2)	3 (6.1)	1.000
Other treatments, n (%)				
No treatments	26 (26.5)	12 (24.5)	14 (28.6)	.647
One or more treatments	72 (73.5)	37 (75.5)	35 (71.4)	
Treatments, n (%)#				
Anxiolytics/hypnotics	57 (58.6)	31 (63.3)	26 (53.1)	.306
Antidepressants	32 (32.7)	15 (30.6)	17 (34.7)	.667
Antipsychotics	25 (25.5)	12 (24.5)	13 (26.5)	.817
Other	10 (10.2)	4 (8.2)	6 (12.2)	.487

Note. #Patients could mark more than one option.
ADHD: Attention deficit hyperactivity disorder; B/N: buprenorphine/naloxone; HBV: hepatitis B virus; HCV: hepatitis C virus; HIV: human immunodeficiency virus; OST: opioid substitution treatment; SD: standard deviation.

Figure 1

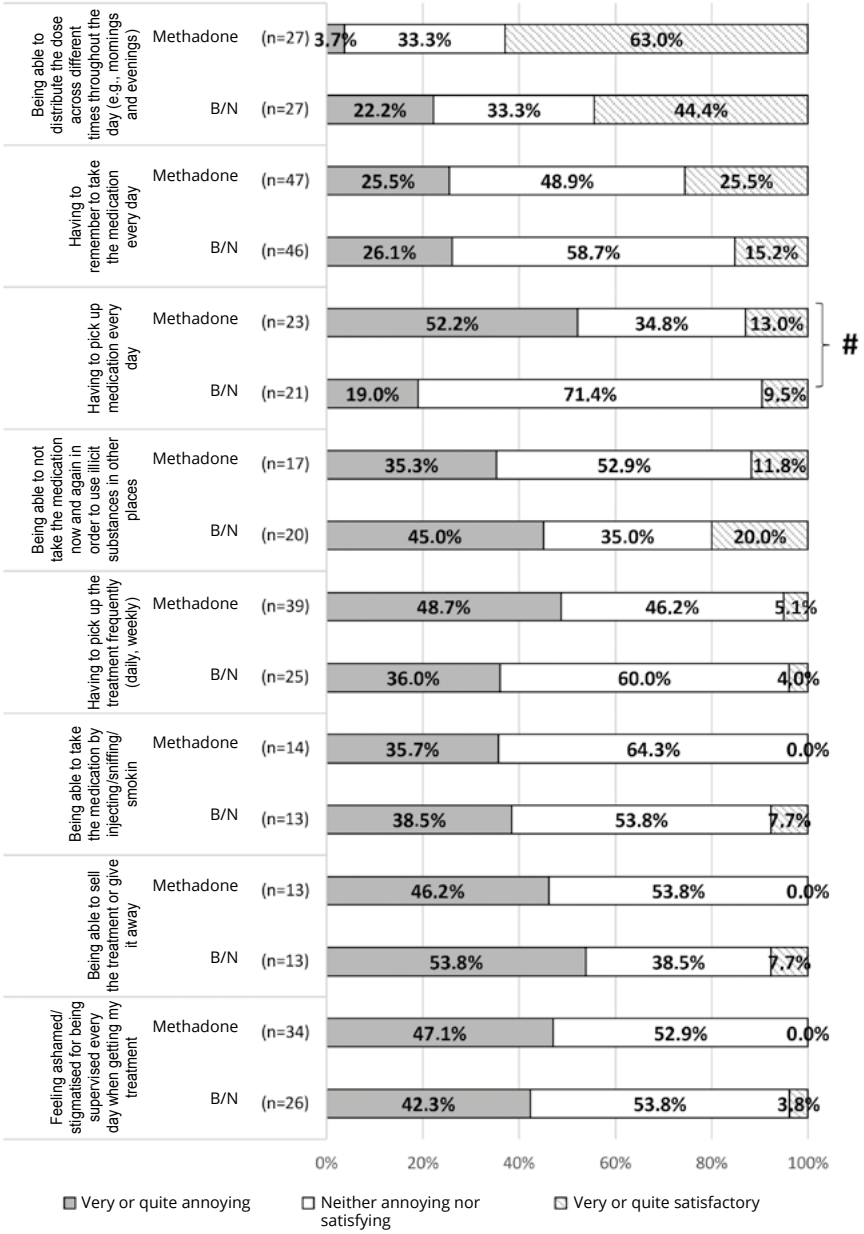
Frequency of medication collection



Note. **2 midding values. B/N: buprenorfina/naloxona. Comparison between treatment groups: p-value < 0.001-. Coparison between groups and monthly frequency and < month: p-value <0.001.

Figure 2

Patient satisfaction with their OST



Note. #p = .032. B/N: buprenorphine/naloxone; OST: opioid substitution treatment

Table 3
Patient experience and satisfaction with OST

Variable	TOTAL (n=98)	Methadone (n=49)	B/N (n=49)	*p*-value
Do you forget to take your medication? n (%)				
No, never or rarely	74 (76.3)	37 (75.5)	37 (77.1)	.855
Yes, sometimes or often	23 (23.7)	12 (24.5)	11 (22.9)	
Missing value	1	0	1	
Have you found yourself in circumstances/conditions which made it difficult or impractical for you to follow your treatment? n (%)				
No, never or rarely	75 (78.1)	35 (71.4)	40 (85.1)	.105
Yes, sometimes or often	21 (21.9)	14 (28.6)	7 (14.9)	
Missing value	2	0	2	
Do you take the prescribed medicine? n (%)				
No, never	1 (1.0)	1 (2.0)	0 (0.00)	.273
Yes, sometimes	3 (3.1)	1 (2.0)	2 (4.1)	
Yes, often	11 (11.2)	3 (6.1)	8 (16.3)	
Yes, always	83 (84.7)	44 (89.8)	39 (79.6)	
What do you do with the medication you don't take on a daily basis? n (%)				
I keep it because I prefer to have reserves for personal use	16 (16.3)	5 (10.2)	11 (22.4)	.210
I sell it from time to time or regularly	1 (1.0)	1 (2.0)	0 (0.0)	
I prefer to keep some in reserve so I can help someone	3 (3.1)	1 (2.0)	2 (4.1)	
It does not apply because I always take the dose of medication that they indicate to me	76 (77.6)	40 (81.6)	36 (73.5)	
Other	2 (2.0)	2 (4.1)	0 (0.0)	
Do you take the medication in one go or distribute it? n (%)				
I always distribute the medication throughout the day	20 (20.4)	13 (26.5)	7 (14.3)	.579
I often distribute medication throughout the day	5 (5.1)	2 (4.1)	3 (6.1)	
I sometimes spread the medication throughout the day	3 (3.1)	2 (4.1)	1 (2.0)	
I rarely distribute medication throughout the day	4 (4.1)	2 (4.1)	2 (4.1)	
I always take my medication in one go	66 (67.3)	30 (61.2)	36 (73.5)	
Satisfaction with the care provided by professionals*				
Mean (SD)	8.9 (1.3)	8.7 (1.5)	9.2 (1.0)	**.048**
Satisfaction with current OST*				
Mean (SD)	8.6 (1.4)	8.4 (1.5)	8.9 (1.3)	.107
Assessment of efficacy of current OST*				
Mean (SD)	8.9 (1.5)	8.5 (1.7)	9.2 (1.1)	**.014**

*Note.**Likert rating scale from 1 to 10, with 1 = more negative and 10 = more positive.
B/N: buprenorphine/naloxone; OST: opioid substitute treatment; SD: standard deviation.

with B/N vs. 75.5% with methadone), and always took the prescribed medication (79.6 % with B/N vs. 89.8% with methadone) as well as the prescribed dose. However, 22.5% and 10.2% of patients with B/N and methadone, respectively, indicated that they saved the untaken daily dose to have reserves for their personal use (Table 3).

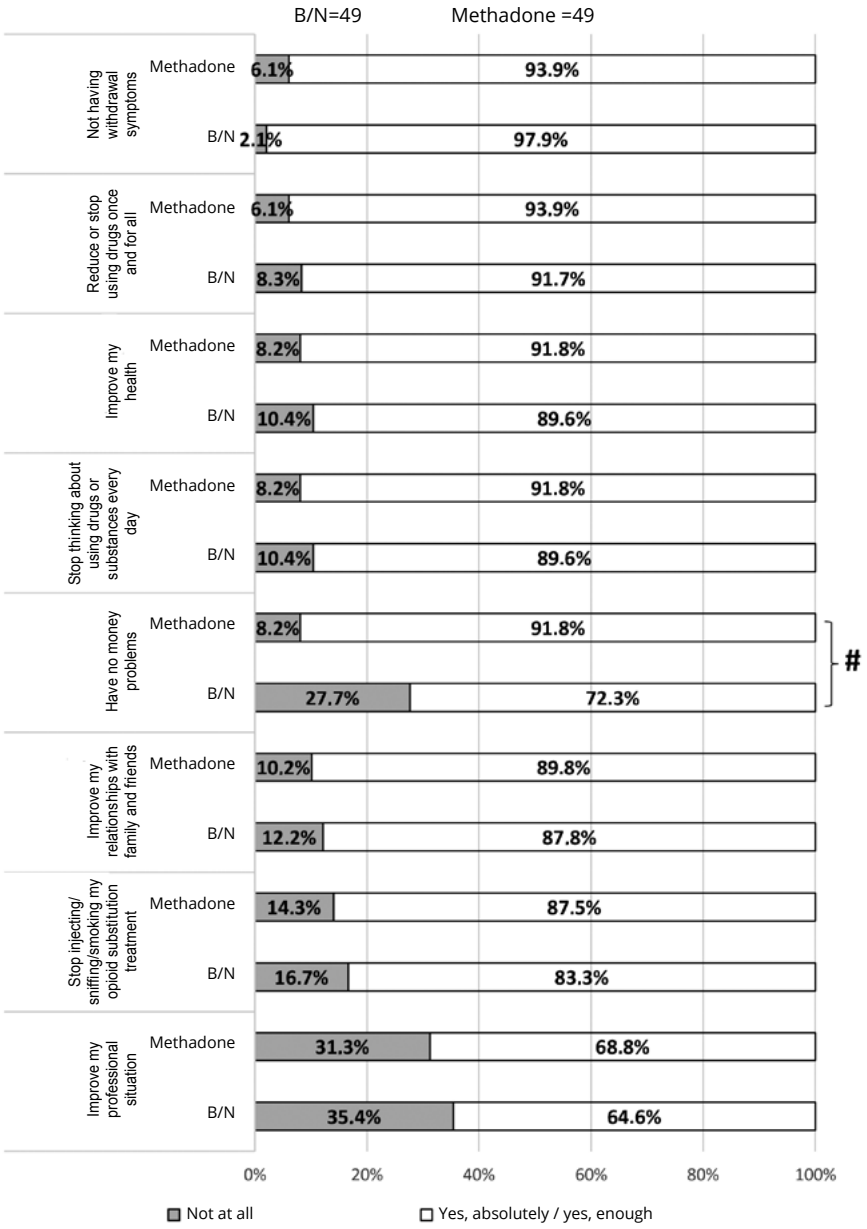
Patient goals

Stopping the use of all types of opioids, including OST, was something that 80.6% of all patients said they would like to do (73.5% with B/N vs. 87.8% with methadone; p =. 109) (data not shown). No significant differences were found between groups when analyzing patient goals with respect to their OST, except in "not having more money problems" (72.3% with B/N vs. 91.8 with methadone; p = .012). The goals reported by the majority (~90%) of the patients were similar between groups: "no more withdrawal symptoms" (97.9% with B/N vs. 93.9 with methadone), "decrease or definitively stop my drug use" (91.7% with B/N vs. 93.9 with methadone), "improve my health" (89.6% with B/N vs. 91.8% with methadone) and "stop thinking about using every day" (89.6% with B/N vs. 91.8% with methadone) (Figure 3).

Patient opinions about their OST

The opinions of patients regarding their treatments are shown in figure 4. In both treatment groups, most patients indicated that their treatment did not cause increased consumption of alcohol (93.9% with B/N vs. 100% with methadone; p = .106), or of illegal substances (95.6% with B/N vs. 91.8% with methadone; p = .679), or other drugs (91.1% with B/N vs. 83.7% with methadone; p = .280), and that they did not want to continue using (93.2% with B/N vs. 87.7% with methadone; p = .492). Significant differences between treatment groups were only observed when patients were asked if they considered their dose to be lower than needed. Approximately three times more patients with methadone felt that their dose was less than

Figure 3
Patient objectives regarding their OST



Note. #p = .012. B/N: buprenorphine/naloxone; OST: opioid substitution treatment.

needed, compared to patients with B/N (13.3% with B/N vs. 34.7% with methadone; p = .016).

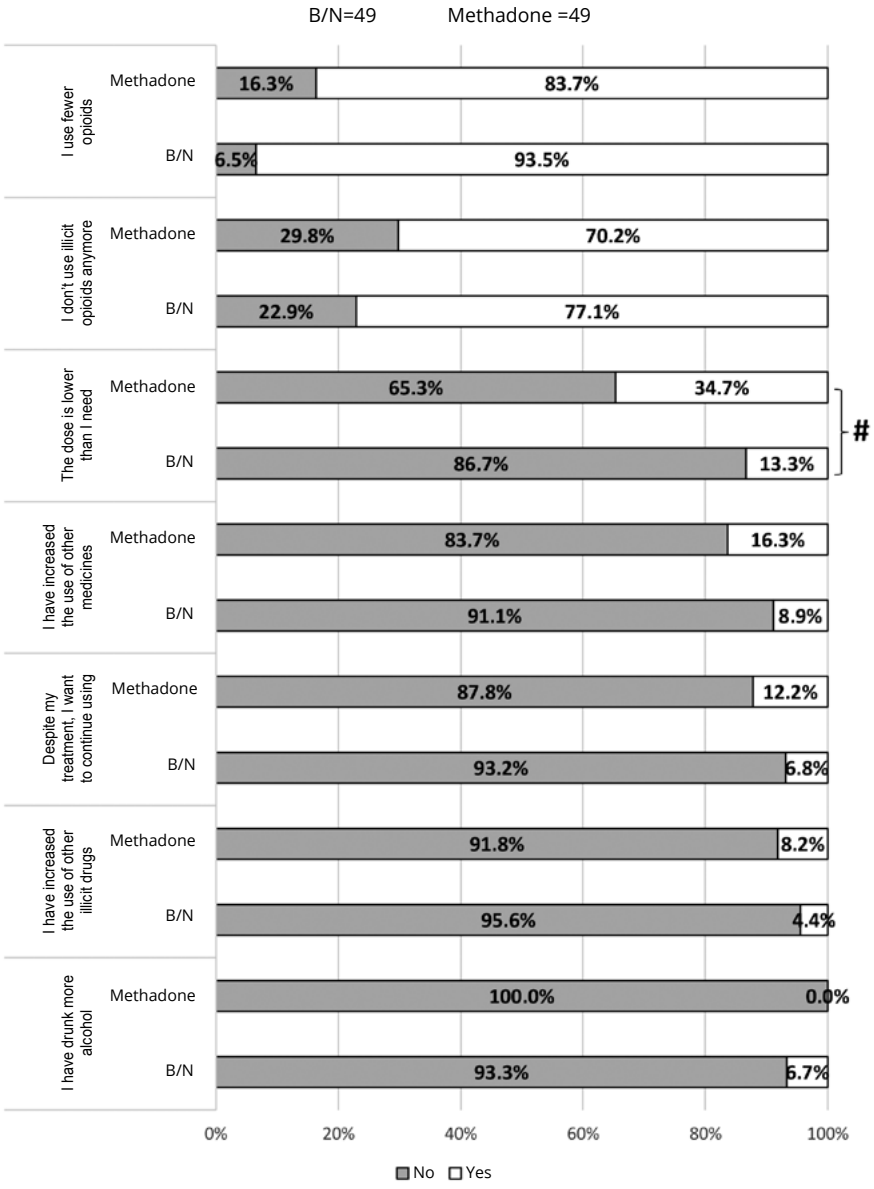
Discussion

This study reports interesting results with regard to treatment satisfaction reported by patients. Aspects such as having to collect the medication daily, stigma, the possibility of consuming illicit opioids during treatment and being able to sell the medication were the most frequently reported reasons for dissatisfaction with their current treatment in both groups of patients (methadone and B/N). Conversely, the reason for the greatest satisfaction was being able to distribute the doses across different times of the day. As far as the authors are aware, the PREDEPO study is the first in Spain to assess the satisfaction, experience, objectives and opinion of patients with OUD with regard to their treatment depending on the OST prescribed.

The profile of sociodemographic and clinical characteristics was similar to that reported in the national statistics for the population with OUD and OST in Spain, with no large differences observed between treatment groups.

Satisfaction with the received OST appeared to be high, and its efficacy was positively rated in both groups, with scores above 8/10 in both cases. However, based on patient responses, there is evidence of a lack of satisfaction with certain aspects. Approximately 20% to 50% of patients in

Figure 4
Patients' opinion of their OST



Note. #p = .016; B/N: buprenorphine/naloxone; OST: opioid substitution treatment.

both groups indicated that their current OSTs did not meet their expectations because they had to collect the medication daily or frequently (which also caused embarrassment or made them feel stigmatized in connection with the treatment), the medication could be misused, other illicit substances could be taken occasionally and they had to remember to take the medication on a daily basis. More than 50% of the methadone patients were dissatisfied with having to pick up the medication daily (more than twice the number of B/N patients). This statistically significant difference was to be expected, since a significantly greater number of patients with methadone (89.9%) collected the medication with a frequency of less than one month, compared to patients with B/N (23.4%).

The need to pick up medication or having to take medication daily is a stigmatizing process for OST patients. This has been reported in other studies in which patients claim that the process of frequent collection and daily dosage of the medication is stigmatizing and, therefore, demand a less frequent dosage of the treatment, which would allow them more free time to normalize both their personal and professional lives (Harris et al., 2012; Neale, Tompkins, McDonald & Strang, 2018; Treloar et al., 2013). The dispensing of treatments at frequently rigid times which are difficult to reconcile with working hours, and dispensing in health centres or in addictive behaviour units where patients with different degrees of addiction coexist would be negative factors for patients who are stabilized

(Socidrogalcohol, 2018). In a study of the opinions of patients with different OST formulations, participants considered that reducing the burden of treatment (both in delivery and administration) would have a series of indirect benefits, such as reduced stigma, improved quality of life and increased time available to complete other life activities (Gilman et al., 2018).

An important limitation of the current OSTs, requiring daily administration, is that the medication can be sold or not taken so that illicit substances can be used from time to time, which results in poor treatment adherence and risk of relapse (Socidrogalcohol, 2018). In this study, around 50% of the patients treated with B/N did not like the fact that they had the possibility of giving away or selling their OST or occasionally being able to stop taking the medication to use illicit substances instead. The need for daily administration with current OSTs, added to the nature of the addiction disorder itself, increases the potential of the drug being abused or used for illicit trafficking, consequently leading to a greater number of relapses (Socidrogalcohol, 2018).

Patients in both groups showed a high predisposition to stop opioid use, including OST (74% with B/N vs. 88% with methadone). In terms of the aim's patients had regarding their treatment, the desire to live without withdrawal symptoms, reduce drug use and improve their health was reported. In addition, a high proportion of patients said they wanted to "have no more money problems" (72% with B/N vs. 92% with methadone). All of the above is in line with results reported in a recent European expert consensus, which recommended that improving physical and mental health, well-being and limiting the social or economic damage for the individual and society associated with the use of illicit drugs were among the treatment goals for these patients (Dematteis et al., 2017).

Most patients reported not forgetting to take the medication, taking the prescribed dose, and not finding it difficult to take. However, this contrasts with published data on lack of adherence in patients with OUD and the high percentage of treatment abandonment, ranging from 23% to 50% of patients treated in outpatient centres for at least four months in severely opioid-dependent patients who had not responded to at least four months of methadone maintenance treatment (McHugh et al., 2013) and 17% to 57% in residential centres over a nine-month period in patients with a DSM-IV diagnosis of substance abuse or lifetime dependence (Samuel, LaPaglia, Maccarelli, Moore & Ball, 2011).

According to these results, patients want to have no more withdrawal symptoms, reduce the number of visits to the centres and the need to take medication every day, stop thinking about using every day, reduce the risk of selling medication and to have the option of not taking the medication to continue using from time to time, and to be able to stop having money problems. Barriers associated with current OUD treatments, along with poor adherence to existing medications, suggest the need for new types of treatments offering advantages over current therapies that reduce the burden of treatment and avoid diversion and misuse, providing another treatment option and increasing the proportion of patients starting a treatment that matches their expectations (Vorspan et al., 2019).

Strengths of this study to be noted are that it was carried out in a context of real clinical practice and with a sample with broad geographic representation across six Autonomous Communities in Spain. Nevertheless, this project has a series of limitations that need to be taken into account. The study used a questionnaire designed specifically for this study based on the one published by Rolland et al. (2021). Other validated questionnaires such as the one by Pérez de los Cobos et al. (2020) were not considered given the very complex population and the authors' awareness that a questionnaire with a specific design could better capture the study information. It would be interesting for further research to carry out a psychometric validation of the questionnaire used to assess its possible applications in other studies. Treatment adherence of the participants was not determined; this would have made it possible to control the results for this factor and could have provided additional information. Although the estimated sample size was reached, it may be that in some of the variables analyzed no significant differences were observed between the treatment groups due to small sample size. Multiple comparisons were not performed by post-hoc procedures in the case of ANOVA to try to reduce the number of comparisons. Given the exploratory or hypothesis-generating nature of the study, it was thought that the most appropriate option was to clarify the objectives of future research. The selection of patients was not carried out randomly, which would have contributed more evidence to the results of the study. Consecutive selection was chosen because it was understood to be more practical for data collection due to the different medication collection periods and the emergency situation resulting from the COVID-19 pandemic.

Conclusion

Based on patient experiences, there appears to be a need for new treatments that address unmet expectations and dissatisfaction with currently available treatments. Patients reported the need for treatments that reduced stigmatization and avoided the need for daily administration; this could potentially improve patient management, adherence to treatment, and quality of life.

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Conflict of interests

For the development of this project, Pharmacoeconomics & Outcomes Research Iberia (PORIB), an independent consultancy specialized in the evaluation of health intervention, has received funding not conditioned on results from Camurus S.L. Carla Assaf Balut is an employee of Camurus S.L, Spain.

The authors Rodrigo Oraá Gil, Gerardo Flórez Menéndez, Pilar Notario Poves, Pedro Seijo Ceballos, Begoña Gonzalvo Cirac and Francisco Pascual Pastor declare that no conflict of interests.

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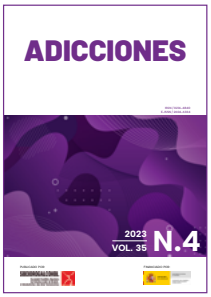

ORIGINAL

Waterpipe use among adolescents. Possible implications and related variables

El uso de la cachimba entre los adolescentes. Posibles implicaciones y variables asociadas

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Abstract

Substance use in waterpipe (generally tobacco or cannabis) constitutes an increasingly popular practice. It has become an emerging public health problem, with serious consequences at both pulmonary and addiction levels. Despite the growing concern it raises, few studies have been carried out in Spain to analyze this new practice from an early age. The aim of this study is to have new data about waterpipe use among adolescents and to analyze its possible implications and related variables. A survey was conducted among secondary school students from the Galician community. A total of 7,613 students aged 12-18 years (M = 14.97; SD = 1.69) participated. The CRAFFT, the AUDIT and the CAST were used to screen the risky use of other substances. The rates of waterpipe tobacco and cannabis use are at worrying levels (19.4% and 8.5%, respectively, for the last year), with significantly higher rates of risky substance use, drunkenness and binge drinking. The low perception risk is striking. Waterpipe use is a widespread practice in adolescence. In addition to serious health implications, is a clear indicator of a problematic underlying consumption. The low perception of risk, the "*botellón*" or the lack of family control are elements to take into account in community prevention.

Keywords: waterpipe, adolescents, tobacco, cannabis, prevention

Resumen

El consumo de sustancias en cachimba (generalmente tabaco o cannabis) constituye una práctica cada vez más popular, hasta el punto de convertirse ya en un problema de salud pública emergente, con serias consecuencias tanto a nivel pulmonar, como adictivo. A pesar de la creciente preocupación que suscita, son pocos los trabajos llevados a cabo en España que se hayan ocupado de analizar esta nueva práctica desde edades tempranas. El objetivo de este trabajo no sólo es disponer de nuevos datos acerca del uso de la cachimba entre los adolescentes, sino también analizar sus posibles implicaciones y variables asociadas. Para ello, se realizó una encuesta entre estudiantes de enseñanza secundaria de la comunidad gallega. Participaron 7.613 estudiantes de 12 a 18 años (M = 14,97; DT = 1,69). Se utilizó el CRAFFT, el AUDIT y el CAST para el cribado de consumos de riesgo. Las tasas de consumo de tabaco y de cannabis en cachimba se sitúan en niveles preocupantes (19,4% y 8,5%, respectivamente, para el último año), con tasas significativamente mayores de consumos de riesgo, de borracheras y *binge drinking*. Llama también la atención la baja percepción de riesgo existente. El uso de la cachimba constituye una práctica relativamente extendida en la adolescencia, que además de serias implicaciones para la salud, constituye un claro indicador de un patrón de consumo subyacente realmente problemático. La escasa percepción de riesgo, la práctica del botellón o la falta de normas familiares son elementos a tener en cuenta a nivel de prevención comunitaria.

Palabras clave: cachimba, adolescentes, tabaco, cannabis, prevención

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In Spain, tobacco use continues to be the leading cause of preventable death (Gutiérrez-Abejón et al., 2015; Pérez-Ríos et al., 2020). According to data from the latest edition of the *Survey on alcohol and other drugs in Spain (Encuesta Sobre Alcohol y otras Drogas en España)* (EDADES 2019-2020), 40.9% of Spaniards between 15 and 64 years of age have smoked in the last year and 34% have done so daily. Among adolescents aged between 14 and 18 years, an incidence of 205,600 smokers (89,300 men and 116,300 women) was reported (Observatorio Español de las Drogas y las Adicciones y Delegación del Gobierno para el Plan Nacional sobre Drogas, 2019). Although cigarette smoking remains the predominant form of tobacco use, other formats have taken centre stage in recent years, for example electronic cigarettes (Lorza, 2019) or waterpipe (also known as hookah, shisha or bong), becoming very popular among young people and teenagers worldwide (Maziak, 2011; Shihadeh et al., 2015).

In Spain, despite the fact that the *Law on Health Measures against Smoking* (Law 28/2005, December 26, on health measures against smoking and to regulate the sale, supply, use and advertising of tobacco products) prohibits "the sale or supply to people aged under eighteen years of tobacco products or any other product that imitates and induces smoking", waterpipe tobacco smoking has become increasingly common among teenagers during social gatherings and at entertainment venues. According to the *Encuesta sobre el uso de drogas en enseñanzas secundarias en España (Survey on drug use in secondary education in Spain) (ESTUDES 2018-2019)*, 47% of students aged from 14 to18 years admit to waterpipe tobacco smoking at some point in their lives, with no significant variation observed by sex (Observatorio Español de las Drogas y las Adicciones y Delegación del Gobierno para el Plan Nacional sobre Drogas, 2020). In terms of its significance, waterpipe smoking is not only synonymous with positive peer feedback, but in some cases represents the first experience of tobacco use for adolescents and thus the gateway to cigarette smoking (Martinasek, McDermott & Martini, 2011; Maziak et al., 2015). Some authors agree that the popularization of waterpipes constitutes an emerging public health problem (Jawad et al., 2018; Maziak et al., 2015; Shepardson & Hustad, 2016), given the greater exposure to toxic compounds involved, compared to conventional cigarettes (Primack et al., 2016). This can reach the equivalent of between 25 and 50 cigarettes for a single waterpipe session (Cobb, Shihadeh, Weaver & Eissenberg, 2011) and is also linked to the longer duration of sessions (1 hour on average compared to 5 minutes for a cigarette) and, therefore, the increased toxicity (Chabrol, Roura & Armitage, 2003; Eissenberg & Shihadeh, 2009; Maziak et al., 2011). Likewise, use at an early age is seen as a predictor of excessive use during adulthood, leading to a higher incidence of related pathologies and an increase in health spending (Fu, Feliu & Fernández, 2020). Recent research even indicates that young waterpipe smokers could develop dependence comparatively earlier than cigarette smokers (6 days/month for waterpipe versus 13.5 days/month for cigarettes) (Bahelah et al., 2016).

Although the most common use of waterpipes involves smoking tobacco, evidence suggests that a significant percentage of young waterpipe smokers (23%) also use them with other substances, generally marijuana or hashish (Sutfin, Song, Reboussin & Wolfson, 2014). According to the ESTUDES 2018-2019 survey, 11.9% of students aged 14 to 18 in Spain who used cannabis in the last 30 days did so in waterpipe (Observatorio Español de las Drogas y las Adicciones y Delegación del Gobierno para el Plan Nacional sobre Drogas, 2020). According to experts, this 'way' of smoking, involving deep inhalation and subsequent holding of breath, sends more smoke to the lungs and, therefore, more Tetrahydrocannabinol (THC), which amplifies the effect, mainly due to its bronchodilator properties (Hall, Degenhardt & Teesson, 2009; Tetrault, 2007). Waterpipe use thus not only means that cannabis has a faster and more intense effect (Chabrol, Massot, Montovany, Chouicha & Armitage, 2002), but is directly linked to higher levels of dependency (Chabrol et al., 2003), as well as to a higher incidence of respiratory diseases (Darawshy, Abu, Kuint & Berkman, 2021).

Paradoxically, despite the growing concern over waterpipe use among young people and adolescents, very few studies analyzing this new practice from an early age with empirical data have been carried out in Spain (Agaku et al., 2014; Jorge-Araujo, Torres-García, Marrero-Montelongo & Navarro-Rodríguez, 2018; Jorge-Araujo, Torres-García, Saavedra-Santana & Navarro-Rodríguez, 2017; Sáenz-Lussagnet, Rico-Villademoros & Luque, 2018). Indeed, the ESTUDES 2018-2019 survey itself only provides two "official" data in this respect, mentioned above. The present study thus aims not only to generate new data that would allow waterpipe use among adolescents to be estimated, but also to provide evidence of its possible implications and to try to identify some associated variables that may be useful at a preventive level.

Method

Participants

To put the stated objective into practice, a selective methodology was used, consisting of a survey conducted among secondary students from schools in the four provinces of Galicia. Purposive sampling was used for sample selection, with a total of 49 schools (38 state-run and 11 state-supervised private schools) agreeing to participate. For inclusion, participants had to be students aged between 12 and 18 years. Exclusion criteria were the refusal to participate and a high percentage of missing

values in the questionnaires or an incoherent response pattern. While the initial sample comprised 7,824 adolescents, 211 were eliminated for not meeting the inclusion criteria or presenting some exclusion criteria. The final sample was composed of 7,613 students aged between 12 and 18 years (M = 14.97; SD = 1.69), of whom 69.8% were students of compulsory secondary education (ESO), 6% were taking vocational training (FP) and 24.2% were taking the higher secondary courses (BAC). When asked about gender, 50.5% marked the option "female" and 48.4% the option "male", with 1.2% selecting "other gender".

Instruments

Data collection was done using a self-administered paper questionnaire divided into three blocks. The first collected information on sociodemographic variables such as age, gender or school year. The second contained questions concerning waterpipe use and habits regarding the use of tobacco, cannabis, alcohol and other substances (in the last year and last month) and patterns of use, such as drunkenness, binge drinking and participation in *botellón* (a common leisure phenomenon in Spain involving gatherings of young people in outdoor spaces to drink alcohol) as well as an ad hoc scale developed to measure the risk perception of such use. The data referring to waterpipe use were collected through four specific items, two referring to tobacco use ("Have you smoked tobacco in waterpipes or shishas in the last year?" and "Have you smoked tobacco in waterpipes or shishas in the last month?") and two more to cannabis use ("Have you smoked marijuana or hashish in waterpipes or shishas in the last year?" and "Have you smoked marijuana or hashish in waterpipes or shishas in the last month?"). In both cases, a dichotomous response format was used (0 = no, 1 = yes). In the third block, three specific scales were included for the screening of risky use: (a) the *Alcohol Use Disorders Identification Test* (AUDIT), developed by the World Health Organization (WHO) as a simple method of screening for problematic alcohol use (Saunders, Aasland, Amundsen & Grant, 1993; Saunders, Aasland, Babor, De La Fuente & Grant, 1993), consisting of ten items assessing the quantity and frequency of drinking (items 1-3), possible dependence symptoms (items 4-6) and problems related to drinking (items 7-10). The scale has a Likert-type response format, ranging from 0 = "Never" to 4 = "four or more times a week" for item 1; from 0 = "Never" to 4 = "Every or almost every day" for items 2-8; and from 0 = "Never" to 4 = "Yes, in the last year" for items 9 and 10. The overall score can range from 0 to 40. The first eight items are scored from 0 to 4 (five ordinal categories) and items 9 and 10 with 0, 2 and 4 points (three categories). This study used a cutoff point of 4, validated in Spain with adolescents in 2017 (Rial, Golpe, Braña & Varela, 2017). Internal consistency obtained was satisfactory (.91). (b) The *Cannabis Abuse Screening Test* (CAST), a tool developed in France in 2002 as part of the ESCAPAD survey (Beck, Legleye & Observatoire français des drogues et des toxicomanies, 2003), comprising six Likert-type items with five response options, ("Never" [0], "Rarely" [1], "Sometimes" [2], "Quite often" [3] and "Very often "[4]). The literature describes two scoring versions: full (CAST-f), in which the score for each item ranges from 0 to 4 and the final score from 0 to 24 and binary (CAST-b), in which each item scores 0 or 1 and the final score ranges from 0 to 6. In the latter, the positive response threshold varies depending on the question: for the first two questions this threshold is set to "sometimes" and for the others to "rarely". In this study, the full scoring version and cutoff point 4 were used, which has been validated with Spanish adolescents by García-Couceiro, Golpe, Braña, Varela and Rial (2020). The internal consistency obtained was .87. (c) The *Abuse Screening Test* (CRAFFT), developed by the *Center for Adolescents Substance Abuse Research* (CeASAR) (Knight et al., 1999) as an early detection tool for the risky use of alcohol and other substances in adolescents. It is made up of three initial (filter) items and six further items making up the CRAFFT proper. An adolescent answering the first three items negatively will only need to answer the first of the six items that make up the CRAFFT; if they answer affirmatively to at least one of the initial items, they then need to answer the next six. As recommended by the validation study with Spanish adolescents by Rial et al. (2018), the cut-off score used in this study was 2. The internal consistency obtained in this case was also acceptable (.74).

Procedure

Data collection was carried out throughout the 2020-2021 academic year in the classrooms of the schools themselves, in small groups and by researchers experienced in this type of task. The procedure was piloted with a 30-strong sample from the same population in order to estimate the time needed to complete the questionnaire, check that questions were correctly understood, and anticipate possible doubts or difficulties in data collection. The time taken to complete the questionnaire was between 20 and 30 minutes. Participants were previously informed of the purpose of the study. Participation was voluntary and unpaid, and anonymity and confidentiality of responses was guaranteed at all times. Consent and approval for the study was given by school management and the respective parents' associations. Parents were sent an information letter expressly indicating the possibility of not participating in the study, in which case their child had to provide a letter to this effect, signed by one of the parents. The study protocol was approved by the Bioethics Committee of the University of Santiago de Compostela (code: USC-035/2021).

Data analysis

Before the analysis itself, data cleaning was carried out, consisting of a check for incoherent response patterns and missing data. Missing value analysis was done following appropriate guidelines (Rial, Varela & Rojas, 2001), checking that the percentage of missing responses did not exceed 5% for any of the questionnaire variables, and also that the distribution of missing cases followed a random pattern.

First, frequencies and percentages were calculated for a descriptive analysis, as were statistics of central tendency and dispersion. Subsequently, to try to illustrate the seriousness of waterpipe tobacco and cannabis smoking in terms of their health implications, the relationships with other consumption variables were studied. Likewise, an attempt was made to explore possible associated variables that could be seen as being at the root of the problem. Some of these related to psychological factors such as perceived risk, others to family factors, for example, the frequency with which young people are allowed to go out, their coming-homes time or the money they have for going out, while others were linked to structural factors like *botellón* participation. To compare the percentages, contingency tables were made, with a chi-square independence test (χ^2) and corresponding calculation of the contingency coefficient (*CC*) to assess the degree of association or correlation. The recommendations of Funder and Ozer (2019) were followed to interpret the effect size. McNemar's test and Wilcoxon's test were used for comparisons between two related samples (or variables). The analyses were performed with the IBM SPSS Statistics 25 statistical package.

Results

Table 1 shows the percentages of consumption of the different substances and the rates of risky consumption. Smoking tobacco and cannabis in the last year was reported by 18.1% and 10.6% respectively. Regarding gender, as with alcohol, tobacco use was significantly higher among girls, while cannabis and other substances were used more widely among boys. Age analysis shows that, although the highest values corresponded to the group of 17 to 18-year-olds, it is worth highlighting the increase noted in the transition from 12-13 years to 14-16 years, with rates of tobacco and cannabis use seven and twelve times higher, respectively, in the latter.

Regarding waterpipe use, 19.4% of adolescents claimed to have used it in the last year to smoke tobacco, with 7.7% reporting doing so in the last month. It is striking that this percentage was higher than that of those who said they smoked tobacco in the usual way (Table 1) ($\chi^2 = 8.57$; $p < .01$). The percentages were slightly higher among girls (Table 2), although the differences were not statistically significant. Regarding waterpipe cannabis smoking, the percentages were 8.5% for the last year and 3.7% for the last month. In this case, the percentages were higher among boys (Table 2) and the differences were statistically significant. There were also differences in terms of age ranges, in both tobacco and cannabis. In the case of tobacco, there was a fivefold increase from 12-13 years to 14-16 and a doubling from 14-16 to 17-18. With cannabis, much lower use was seen at early ages, although the increase with age was more pronounced.

As can be seen in Table 3, waterpipe smoking does not seem to be an isolated phenomenon since the percentages of positives in the three screening tools used (AUDIT, CAST and CRAFFT) were significantly higher among those who used waterpipe to smoke tobacco and/or cannabis. In the case of cannabis, the rate was 20 times higher. Moreover, having smoked a waterpipe in the last year is significantly linked to adopting new forms of use, such as alcohol with energy drinks (e.g., *Jägermeister* with *Monster* or *Red Bull*) or so-called *purple drank*, *lean* or *sizzurp*, in addition to a five- or six-times stronger binge drinking pattern. The values of the contingency coefficient ranged between .28 and .46 (Table 3).

With regard to risk perception (Figure 1), 37.8% of those surveyed attributed little or no risk to waterpipe tobacco smoking, a percentage significantly higher than that attributed to smoking ten cigarettes on the same day ($Z = 33.35$; $p < .001$). With cannabis, although 24.7% felt there was little or no risk involved in waterpipe smoking of marijuana or hashish, the perception of risk was higher than that attributed to smoking a 'joint' at the weekend ($Z = 32.48$; $p < .001$). Table 4 also shows how consumption rates significantly fell with higher risk perception.

Participation in *botellones* could be a contributing factor in waterpipe use as an associated element of a structural nature. As can be seen in Table 5, the percentages of waterpipe use among those who went to *botellones* was between 9 and 12 times higher.

Finally, in relation to the partying habits of adolescents, Table 6 shows that waterpipe tobacco and cannabis smoking rose significantly as money available and coming-home times increased.

Discussion

Designing programs for the prevention of tobacco and/or cannabis consumption requires regular study of the contexts of use. This involves being aware of the appearance of new rituals or formats, such as waterpipes, the use of which present risks in itself (greater exposure to toxins, greater risk of infection with respiratory diseases, etc.) (Galindo, González, Espigares & Moreno, 2019; Primack et al., 2016), in addition to certain added peculiarities (lower risk perception, gateway to consumption, etc.) (Jorge-Araujo et al., 2018; Maziak et al., 2015). This study aimed to provide

Table 1
General data on use and risky use (global and by category)

	Global (%)	Women (%)	Men (%)	χ^2	CC	12-13 years (%)	14-16 years (%)	17-18 years (%)	χ^2	CC
Last year										
Alcohol	39.7	41.5	38	9.78 **	.036	7	40.5	72.5	1488.36***	.405
Tobacco	18.1	20	16.2	17.40***	.048	2.5	18	35.1	596.81***	.270
Cannabis	10.6	9.5	11.9	11.18**	.039	0.9	9.8	23	435.15***	.233
Cocaine	0.7	0.3	1.1	20.36***	.052	0.1	0.7	1.4	21.18***	.053
Heroin	0.2	0	0.4	16.75***	.047	0	0.3	0.3	4.80	.025
Speed and amphetamines	0.7	0.4	1.1	12.58***	.041	0.1	0.6	1.7	33.29***	.066
Hypnosedatives	0.9	0.6	1.2	6.88**	.033	0.2	0.9	1.8	19.41***	.054
Alcohol with Energy Drinks [a]	32.6	32.6	32.6	0	0	15.1	32.7	50.9	483.22***	.245
Purple drank [b]	5	3.5	6.6	38.45***	.071	1.6	5	8.6	84.45***	.105
Drunkenness	20.6	20.3	20.9	.47	.008	1.2	19	45	987.95***	.339
Binge drinking [c]	17	16.1	18	4.85*	.025	1.3	15.1	38.8	850.77***	.318
Botellón	33	34.9	31.1	11.91**	.040	3	31.9	67.8	1565.88***	.415
Last month										
Alcohol	25.6	26	25.2	.68	.010	2.5	24.4	53.2	1130.45***	.360
Tobacco	13	14.4	11.7	11.56**	.039	1.2	12.4	27.1	494.07***	.247
Cannabis	6.8	6	7.7	8.10**	.033	0.8	6.1	15	273.53***	.186
Cocaine	0.4	0.1	0.7	16.21***	.046	0.1	0.4	0.7	8.52*	.033
Heroin	0.2	0	0.3	12.56***	.041	0	0.2	0.2	3.76	.022
Speed and amphetamines	0.4	0.1	0.7	15.24***	.045	0	0.3	0.9	17.42***	.048
Hypnosedatives	0.3	0.1	0.6	14.77***	.048	0.1	0.2	0.9	16.69***	.050
Alcohol with Energy Drinks [a]	14	13.1	14.9	4.91*	.026	6	13.1	25	254.63***	.180
Purple drank [b]	1.2	0.5	1.9	28.62***	.062	0.4	1.2	1.9	17.67***	.048
Botellón	17.3	18.2	16.5	3.75	.022	0.6	14.6	42.4	1048.88***	.350
Binge drinking [c]	6.3	5.5	7.1	8.33**	.033	0.5	5	15.7	355.95***	.212
Drunkenness	11.5	11.4	11.7	.18	.005	0.5	10.1	27.2	596.81***	.270
Risky use										
AUDIT + [d]	24.4	24.9	24	.89	.011	3.6	23.2	49.7	962.43***	.335
CAST + [e]	5.5	4.4	6.7	16.49***	.050	1	5.4	12.3	175.68***	.162
CRAFFT + [f]	20.7	20.9	20.6	.15	.004	4.4	20	39.9	641.70***	.279

Note. (*) p < .05; (**) p < .01; (***) p < .001. (a) *Jägermeister with Red Bull/Monster*. (b) *Purple drank, Lean o Sizzurp*. (c) 6 or more alcoholic drinks in a single sitting. (d) Positive in AUDIT. (e) Positive in CAST. (f) Positive in CRAFFT.

Table 2
Waterpipe use (global and by category)

	Global (%)	Women (%)	Men (%)	χ^2	CC	12-13 years (%)	14-16 years (%)	17-18 years (%)	χ^2	CC
Last year										
Tobacco	19.4	19.8	18.9	.95	.011	3.6	19	37	593.11***	.269
Cannabis	8.5	7.4	9.7	13.13***	.042	1	8	18.1	312.45***	.199
Last month										
Tobacco	7.7	7.9	7.5	.44	.008	1.2	8	14	190.64***	.157
Cannabis	3.7	3.1	4.3	7.29**	.031	0.4	3.4	8	140.94***	.135

Note. (**) p < .01; (***) p < .001.

Table 3
Comparison between waterpipe users and non-users

	WATERPIPE USE IN THE LAST YEAR							
	Tobacco				Cannabis			
	Yes (%)	No (%)	χ^2	CC	Yes (%)	No (%)	χ^2	CC
Alcohol with energy drinks [a]	72.9	22.9	1351.69***	.389	84.6	27.8	875.86***	.322
Purple Drank [a]	18	1.9	648.71***	.281	29.3	2.8	877.69***	.322
Drunkenness [a]	61.2	10.8	1846.33***	.442	72.8	15.7	1183.05***	.367
Binge Drinking [a]	53.1	8.3	1686.62***	.427	63.4	12.7	1082.97***	.354
AUDIT +	70	13.5	2053.76***	.461	81.1	19.1	1237.99***	.374
CAST +	23	1.8	829.16***	.335	45.2	2.1	1739.65***	.458
CRAFFT +	59.8	11.3	1701.74***	.428	75.9	15.6	1317.36***	.384

Note. (***) p < .001. (a) Reported use in the last year.

Figure 1
Perceived risk of tobacco and waterpipe cannabis smoking (%)

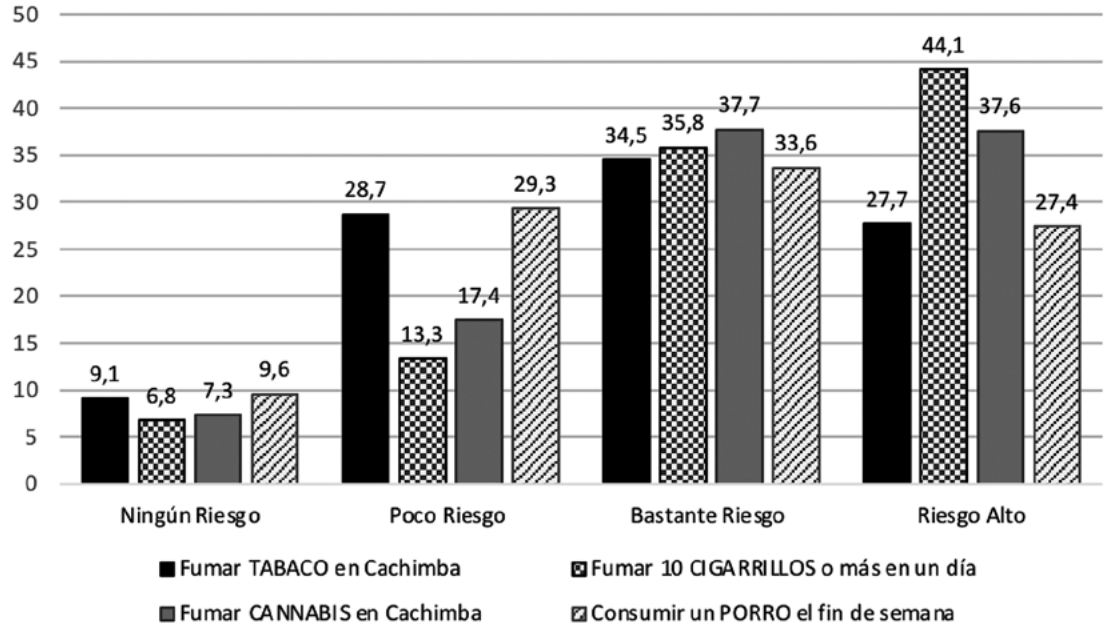

Table 4
Waterpipe tobacco and cannabis smoking by risk perception

	PERCEIVED RISK OF WATERPIPE TOBACCO USE					
	No risk (%)	**Low risk (%)**	**Quite risky (%)**	**Very risky (%)**	**χ^2**	**CC**
Waterpipe tobacco in the last year	38.6	34	13.3	5.4	672.73***	.306
	PERCEIVED RISK OF WATERPIPE CANNABIS USE					
	No risk (%)	**Low risk (%)**	**Quite risky (%)**	**Very risky (%)**	**χ^2**	**CC**
Waterpipe cannabis in the last year	27.9	21.8	5.9	2.2	606.69***	.292

Note. (***) p < .001.

Table 5
Waterpipe tobacco and cannabis use by "botellón" participation

	BOTELLÓN IN THE LAST YEAR			
	Yes (%)	**No (%)**	**χ^2**	**CC**
Waterpipe tobacco in the last year	48	5.2	1949.89***	.454
Waterpipe cannabis in the last year	22.6	1.7	930.54***	.332

Note. (***) p < .001.

Table 6
Waterpipe tobacco and cannabis use by partying habits

	COMING-HOME TIME					
	Before 2 in the morning (%)	**Between 2 and 4 in the morning (%)**	**Between 4 and 6 in the morning (%)**	**Later than 6 in the morning (%)**	**χ^2**	**CC**
Waterpipe tobacco in the last year	9.8	28.8	49.6	61.1	858.50***	.377
Waterpipe cannabis in the last year	3.2	12.6	23.9	40.1	586.11***	.319
	MONEY AVAILABLE FOR GOING OUT					
	Under €10 (%)	**Between €11 and €20 (%)**	**Between €21 and €30 (%)**	**More than €30 (%)**	**χ^2**	**CC**
Waterpipe tobacco in the last year	15.4	26	35.7	39.6	198.35***	.192
Waterpipe cannabis in the last year	6.7	11.8	16	22.9	115.38***	.147

Note. (***) p < .001.

new data on the use of waterpipe among adolescents, as well as to find new evidence regarding the implications it may have in terms of consumption patterns and also to identify relevant variables at the level of prevention.

The results obtained show rates of waterpipe tobacco and cannabis use at worrying levels. Waterpipe tobacco smoking 'attracts' about 1 in 5 adolescents aged 12 to 18, and nearly 1 in 10 are attracted to smoking cannabis in this way. The figures do not reveal significant differences by gender in the case of tobacco, although there is a significantly higher acceptance of cannabis among young men. These results are in line with those obtained in a study carried out in Spain in 2017 (Jorge-Araujo et al., 2017). However, the fact that little official data exists at the national level (Observatorio Español de las Drogas y las Adicciones y Delegación del Gobierno para el Plan Nacional sobre Drogas, 2020) prevents timely interpretation of the scope of these and the definition of trends with the necessary rigor (Maziak et al., 2015).

In the 12 to 13 years age group, it should be noted that almost 3 out of 100 adolescents have already used waterpipe tobacco in the previous year. Despite broad substantiation by the scientific community of the consequences associated with such early onset (Shihadeh et al., 2015), the scarcity of epidemiological studies at the national level and the underestimation of data described in some instances (Jorge-Araujo et al., 2017) should not be overlooked. Moreover, consolidation of consumption is evident insofar as it affects two in every 100 adolescents between the ages of 14 and 16 and almost four in every ten between 17 and 18.

The percentage of adolescents who reported having used tobacco in the last year is lower than that of those reporting smoking waterpipe tobacco in the same period. This was also evidenced in the ESTUDES survey (Observatorio Español de las Drogas y las Adicciones y Delegación del Gobierno para el Plan Nacional sobre Drogas, 2020) and may be connected to the fact that many adolescents do not consider that they are smoking tobacco when they use a waterpipe. Rather than seeing it as smoking, waterpipe use is more of a fashion or ritual for them, a part of their socialization.

Nevertheless, given that waterpipe users have significantly higher positive AUDIT, CAST and CRAFFT scores, waterpipe use, in addition to constituting a risk in itself, could be seen as a clear indicator of the existence of a really problematic underlying consumption pattern. Rates of binge drinking, problems with alcohol and substance use in general are five or six times higher among adolescents smoking waterpipe tobacco and up to 13 times higher with waterpipe cannabis smokers. In light of these results, there seems to be little doubt that waterpipe use among adolescents is far more than a simple trend.

In line with the results of previous studies, it was also possible to verify the low perception of existing risk. Everything appears to indicate that we are facing a phenomenon that has become part of adolescent smoking habits, and one seen as low risk (Al-Naggar & Bobryshev, 2012; Daniels & Roman, 2013; Haroon, Munir, Mahmud & Hyder, 2014; Jorge-Araujo et al., 2018), despite the important health consequences involved (Darawshy et al., 2021; Eissenberg & Shihadeh, 2009). It is thus striking that although the scientific literature warns of the earlier dependence that young waterpipe smokers could develop compared to traditional cigarette smokers (Bahelah et al., 2016), adolescents believe that smoking ten cigarettes on the same day is riskier than smoking tobacco in a waterpipe. This makes it necessary for health professionals to focus on smoking prevention in this new mode of use by trying to change risk perception. An increase in this could lead to a fall in consumption of up to 10%.

In addition to the indisputable role that this risk perception appears to play when looking for possible predictors, this study was able to show the importance of other variables of a structural nature. To understand waterpipe use, it is necessary to understand the context in which adolescents do it. The results obtained indicate that adolescents participating in *botellones* presented between 9 and 12 times higher waterpipe smoking rates, so it seems difficult to reduce waterpipe use if the problem of the *botellón* is not addressed (García-Couceiro et al., 2020).

In addition, although the degree of association is lower, 'family' variables such as coming-home time and money available are also elements to take into account since both show a positive and significant association with rates of waterpipe use. This matches what some other authors have indicated (Llorens, Barrio, Sánchez, Suelves & ESTUDES Working Group, 2011) and once again highlights the important role played by the family in substance use.

Finally, it should be noted that this study is not without limitations. Despite a relatively large sample (larger than that of other studies carried out in Spain on the same subject), the fact that a probabilistic sampling strategy was not used makes it impossible to interpret the results from an epidemiological perspective, and at no point was it therefore possible to discuss the issue in terms of 'prevalence'. Similarly, the methodological design used means that the relationships found between the variables cannot be interpreted in terms of causality. Only a longitudinal design would allow a causal relationship to be established in order to distinguish between antecedents or prognostic factors and subsequent or possible implications. Furthermore, deep reflection on the study itself suggests the need to incorporate certain clinical variables in future studies, such as possible cognitive disorders or related health problems. In terms of statistical analysis type, uni- and bivariate descriptive analysis was employed, but the availability of a starting theoretical model and a set of

duly selected variables would have permitted the use of a multivariate approach. Finally, it should be noted that all variables collected in this study were self-reported, meaning that responses could depend on the subjectivity of the adolescents, who may have under- or overestimated their behaviours. However, as different experts in the field of addictive behaviours have previously pointed out (Babor, Kranzler & Lauerman, 1989; Winters, Stinchfield, Henly & Schwartz, 1990), self-report measures have been shown to be equally reliable in assessing the consumption habits of young people and adolescents.

In conclusion, the present study finds worrying rates of waterpipe tobacco and cannabis smoking in the Galician adolescent population, which is becoming extremely worrying in the younger age groups. In addition, a significant association was demonstrated with a harmful consumption pattern, as well as with structural and family variables. This reinforces the idea that we are facing a phenomenon that appears to have established itself among the habitual smoking practices and rituals of young people, and one which is seen as low risk despite the serious health consequences. Therefore, it is necessary to urge health professionals and institutional managers to take note of the impact of this new trend in smoking, take the appropriate preventive, legal and socio-educational measures and appeal to families to get involved in them.

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Conflict of interests

The authors of this article declare no conflict of interest.

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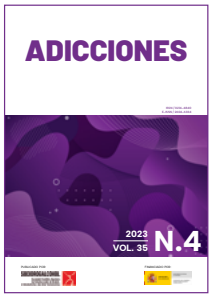

ORIGINAL

Effects of the lockdown due to the COVID-19 pandemic on alcohol consumption in patients under treatment in an alcohol relapse prevention programme

Efectos del confinamiento en el hogar debido a la pandemia por COVID-19 en el consumo en pacientes en tratamiento en un programa de deshabituación de alcohol

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Abstract

During the COVID-19 pandemic, several exceptional measures were put in place in order to avoid virus propagation, such as lockdown and the discontinuation of usual health care assistance services. It was considered that these changes might be associated with an increase in alcohol consumption and a higher risk of relapse for patients under treatment. The aim of this study was to assess changes in alcohol consumption during the lockdown period (between March and May, 2020) in patients following treatment under the Alcohol Use Disorders Programme at the "Hospital 12 de Octubre" in Madrid. A total of 311 patients were assessed through interviews carried out by telephone in accordance with usual clinical practice during that period. 76% of the total number of patients did not experience changes in their alcohol consumption, 9.2% stopped drinking and some experienced severe withdrawal syndrome, while 7.5% relapsed. The risk factors found for worsening the prognosis of the patients were: being female, drinking alcohol alone or at home, binge drinking, concomitant substance misuse and failure to attend therapy groups or self-help groups online during the lockdown. 31.6% of the sample described psychopathological symptoms due to the lockdown, especially those who already had psychiatric comorbidities. For this reason, we can conclude that during the lockdown as a result of the pandemic, most of our alcohol dependent patients did not modify their drinking patterns, but specific factors enabled us to identify a more vulnerable subgroup.

Key words: alcohol use disorder, lockdown, Covid-19, group therapy, lockdown psychopathology, psychiatric comorbidity

Resumen

Durante la pandemia producida por la infección por el Covid-19 se produjeron una serie de cambios sociosanitarios excepcionales para evitar su propagación como el confinamiento en el hogar y la supresión de los servicios asistenciales sanitarios habituales. Se consideró que estos cambios podrían implicar un incremento en el consumo de alcohol y un mayor riesgo de recaídas para los pacientes en tratamiento. El objetivo de este estudio fue valorar los cambios en el consumo durante el período de confinamiento (marzo a mayo de 2020) en los pacientes en tratamiento en el programa de alcohol del Hospital Doce de Octubre de Madrid. Fueron valorados 311 pacientes mediante entrevista telefónica dentro de la práctica clínica habitual durante ese período. Un 76 % de los pacientes no presentaron cambios en su situación de consumo, un 9,2% de estos cesaron en el consumo, algunos de ellos con cuadros de abstinencia graves, y un 7,5% recayeron. El sexo femenino, el consumo en solitario o en el hogar, en atracón, o el de otras drogas de forma concomitante y el no estar en terapia grupal o no asistir a grupos de las asociaciones de ayuda mutua por videoconferencia durante el confinamiento fueron factores predictores de mal pronóstico. Un 31,6% presentó alteraciones psicopatológicas debidas al confinamiento, sobre todo, aquellos pacientes con comorbilidad psiquiátrica. Por lo tanto, en situaciones similares a esta, la mayoría de los pacientes en tratamiento no modifican el patrón de consumo, pero, ciertas características identifican un subgrupo de sujetos más vulnerables.

Palabras clave: trastorno por uso de alcohol, confinamiento, Covid-19, terapia grupal, psicopatología por confinamiento, comorbilidad psiquiátrica

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On March 14, 2020, the Spanish government declared a state of emergency (Real Decreto 463/2020) as a result of the Covid-19 pandemic, a pandemic declared by the WHO on March 11 (WHO, 2020a), placing the majority of the population in a lockdown situation. Such an exceptional and unknown situation led to concern about the repercussions these measures might have on mental health and drug use in the population. The media generated an avalanche of news on this topic which was often contradictory and not based on data, given the absence of such. Mobility restrictions impacted the illicit market, disrupted addicts' supply (Dietze & Peacock, 2020) and access to treatment (Alexander, Stoller, Haffajee & Saloner, 2020). Addicts in adverse social situations became extremely vulnerable to infection by Covid-19 and regarding care by social health resources (Volkow, 2020). People using illicit drugs may contract more cardiovascular and respiratory diseases, being more vulnerable to damage from Covid-19 infection (Laporte & Healy, 2020; PND, 2020). Furthermore, Covid-19 medications may be of lower efficacy and worse tolerance in addicts (Ghosh, Roub & Bisaga, 2020) and lead to pharmacological interactions (Anmella et al., 2020). Guidelines have been established for managing lockdown in addicts and their care services (EMCDDA, 2020; Instituto de Adicciones, 2020; Jiang et al., 2020; Ornell et al., 2020; Osalde, 2020; PND, 2020; Servicio Madrileño de Salud, 2020; United Nations Office on Drugs and Crime, UNODC, 2020; Vecchio et al., 2020). In the same spirit of concern regarding access to health services for addicted patients, several scientific societies have also published recommendations for the care of this population (Sociedad Española de Patología Dual, 2020; Socidrogalcohol, 2020).

With regard to smokers, a meta-analysis (Vardavas & Nikitara, 2020) of patients infected with Covid-19 showed that smoking worsened the prognosis of the disease. The WHO, the Spanish Ministry of Health and various researchers warned of this greater severity of Covid-19 among smokers (Correa & Redolar-Ripoll, 2020; Ministerio de Sanidad, 2020; WHO, 2020b) in response to media reports of a possible protective role of nicotine (Trujillo, 2020). Similarly, news emerged regarding the possible benefits of consuming other drugs or the usefulness of preparations based on them (Pascual, Isorna, Carvalho, Carvalho & Arias, 2020; Wang et al., 2020).

Regarding alcohol, sales in supermarkets were seen to rise and an increase in home consumption by habitual users in lockdown was posited (Hipólito, 2020). In mid-April, in full lockdown, the Spanish Ministry of Agriculture, Fisheries and Food published data showing an increase in beer consumption in the middle weeks of the month of 86.5%, a rise of 73.4% in wine and of 93.4% in spirits. It was reported that many people who were considered social drinkers drank the same amount or more than before, despite lockdown (Bazaga, 2020). There was a general sense that alcohol use increased, as stated by the Valencia College of Dietitians and Nutritionists (Bustelo, 2020) or some addiction treatment services (news report Europa Sur, 2020). However, this increase in the sale of beverages for home use could be due to the closure of bars, similar to the case of cigarette sales increasing in tobacconists because other points of sale were closed (news report, La Voz de Galicia, 2020).

Rehm et al. (2020) suggest two possibilities with regard to alcohol use during lockdown: an increase in consumption due to stress caused by the situation or a decrease given reduced availability. It was concluded that an initial decrease would then be replaced by a stress-related increase.

As a result of some statements by health professionals, the press has generally considered that lockdown leads to greater frustration, thereby increasing the risk of relapse in patients receiving treatment for alcohol dependence (E.P. 2020; Fuentes, 2020; news report, Infosalus, 2020), which may also be a result of therapies being broken off (news report, La Vanguardia, 2020). Lockdown has therefore been seen more as a risk factor for alcohol use than as an aid (news report, El Progreso, 2020; news report, La Vanguardia, 2020). Some specialists have suggested a potentially greater risk of increased use, but a lower likelihood of addiction onset (news report, Farmacosalud, 2020), or a greater risk in those patients whose habitual consumption was at home (Arana, 2020). Another concern that arose is the increase in alcohol withdrawal syndrome due to the usual healthcare services being less accessible and to changes in consumption patterns (Marsden et al., 2020).

Although the situation was exceptional, as mentioned, extrapolating from similar previous situations would predict an increase in psychopathological disorders. During the 2015 outbreak of the Middle East coronavirus respiratory syndrome (MERS-CoV), resulting in nearly 17,000 people in lockdown, an increased risk of post-traumatic stress symptoms was observed in health workers who had treated infected patients (Lee, Kang, Cho, Kim & Park, 2018), and symptoms of anxiety and depression were also noted among those under lockdown measures (Yoon, Kim, Ko & Lee, 2016), symptoms which in many cases persisted for months after lockdown (Jeong et al., 2016). It has been hypothesised that the negative psychopathological consequences of lockdown can favour drinking, which would in turn reduce the immune response and increase complications resulting from Covid-19 (Mota, 2020; Testino, 2020). Moreover, some authors have refuted the false belief that alcohol could kill the virus, which has caused problems in some countries (Chick, 2020) and have shown that, on the contrary, it could worsen the inflammatory response, in addition to the existing risk of contagion from sharing drinks (Mungmungpuntipantip & Wiwanitkit, 2020).

Likewise, the increase in sales of this substance has sparked a debate about limiting its sale (Marsden et al.,

2020). There has been criticism that certain businesses selling alcohol were nominated as essential resources, thus facilitating drinking at home (Reynolds & Wilkinson, 2020).

Our interest was focused on assessing the effects of lockdown on our patients and on those who were going to start the alcohol treatment programme, evaluating the extent to which consumption patterns and time or type of treatment were important in possible relapses and changes in consumption. The psychopathological impact of lockdown was also assessed. The resulting data can help guide preventive and therapeutic measures in the face of similar future situations.

Methodology

Patients

The study included all patients undergoing treatment in the alcohol programme of the Doce de Octubre hospital in Madrid. Additionally, patients were also assessed whose appointment to start the programme during the month of March 2020 was cancelled due to the discontinuation of ordinary outpatient care.

Patients are referred to the alcohol programme by primary care centres, other outpatient medical specialties, and also include those hospitalised for medical problems with alcohol dependence. After initial assessment by a professional, participants join the hospital's outpatient treatment programme for alcohol use disorder (AUD). This treatment is designed to last for at least two years and involves attendance at group therapy once a week in addition to close supervision by a psychiatrist and a nurse. Group treatment covers the majority, but there are other patients who, for personal reasons or because of issues with attending the group sessions, only have individual follow-up. A large number of patients are treated with alcohol aversives. The programme is structured in different phases: reception, cessation and preparation for discharge.

Phase 1: Reception and psychoeducation. The psychotherapeutic intervention in this phase is focused on increasing the motivation to change and offering psychoeducation on AUD. It takes place in the psychiatric day hospital or in mental health centres (MHCs). Visits usually take place every working day, the group, which is an open group, meets weekly and patients attend for around 2 months.

Phase 2: Relapse prevention and social skills. This phase is structured across 16 sessions in a weekly group format of relapse prevention followed by 12 sessions of social skills, in addition to individual follow-up and supervision by nurses.

Phase 3: Preparation for discharge. This group also meets weekly, and the focus in this phase is consolidating abstinence. The phase is of variable duration, depending on the progress of each patient but usually lasts until the two years of follow-up are completed, although it is extended for those patients who have had relapses or are at risk of these.

Treatment is carried out on an outpatient basis in the hospital or in the three (MHCs) dependent on the hospital where a psychiatrist and a nurse are in charge of the programme, and individual and group monitoring is also carried out.

Procedure

During the months of March, April and May 2020, when the state of emergency was decreed, our programme was mostly realised by telephone, with face-to-face attendance only in case of emergencies, and group therapy suspended. All patients undergoing treatment were called regularly and consumption status and psychopathological repercussions of lockdown were assessed. Relatives living at the patient's home were also consulted to corroborate the clinical situation. Previous clinical information was gathered from the patient's medical history. Validated psychopathology scales were not used and the presence of psychopathological disorders was instead considered when the patient required a specific psychopharmacological or psychotherapeutic intervention for this reason. In case of doubt regarding possible consumption, face-to-face contact was attempted. At the end of May and during the month of June, face-to-face consultations were restarted and information previously collected was corroborated.

Possible psychiatric comorbidity linked to the presence of some mental disorder prior to lockdown was assessed through the clinical interview. Alcohol consumption patterns were labelled 'continuous' for drinking daily, 'binge drinking' for more than five drinks in a short period of time but not daily drinking, and 'irregular' for neither of the above patterns. Participants who only drank with other people were classified as 'social' drinkers, 'solitary' drinkers used alcohol predominantly alone and in 'mixed' drinkers both types of consumption were the case. The preferred place of consumption was assessed and classified in a dichotomous variable, labelled 'at-home' for home drinking and 'outside' when alcohol was not drunk at home. The telephone interviews explored whether patients attended group meetings by videoconference organized by self-help groups. The type of lockdown was also explored, whether or not they were able to leave home for work reasons, as well the work they were doing and how often and why people living at home with the patient went out.

Statistical analysis

Descriptive analyses of quantitative and qualitative variables were performed. The Kolmogorov-Smirnov test was used to analyze whether the quantitative variables had a normal distribution. Since none conformed to the normal distribution, the Mann-Whitney U test was performed for the comparison of 2 independent samples and the Kruskal-

Wallis test for 3 samples. For categorical variables, the Chi-square test (or Fischer's exact test, if applicable) was used. ORs and 95% confidence intervals were calculated.

Multiple regression analysis was performed to explore which parameters can predict changes in alcohol use and the presence of psychopathology, with binary logistic regression models for binary dependent variables and a multinomial logistic regression for the three-category variable of changes in consumption. The models initially included those variables with p below 0.1 and those that could be relevant, such as age or sex, following a backward stepwise strategy and the maximum likelihood estimation method. All analyses were performed with the statistical programme SPSS, v.23.

Results

Table 1 describes the characteristics of the sample. Twenty-six patients registered for the programme ("new" patients) had not yet started it, and 153 patients were in treatment in the hospital and 132 in the MHCs. Weekly groups were attended by 48.3%. Subjects who were abstinent prior to lockdown comprised 77.7% of the sample, with 88.2% not leaving their homes and 9.9% able to leave for work reasons.

Changes in drinking during lockdown

Of the total sample, 232 patients (76.1%) did not change the amount of alcohol they consumed, 23 patients (7.5%) started to drink during lockdown and 9 (3%) subjects increased the frequency or amount of drinking, while 28 patients (9.2%) stopped drinking and 10 (3.3%) reduced drinking frequency or amount. Three patients did not change the frequency of drinking but increased the use of anxiolytics (Table 1).

The rise in drinking during lockdown was associated with being female, binge drinking, cannabis use and not being in group treatment or attending videoconference groups during lockdown, as well as with greater psychopathology during lockdown. Solitary use, cannabis use and not being in group therapy were also associated to a lesser degree with changes in drinking (Tables 2 and 3).

During lockdown, 242 patients were abstinent and 63 had active consumption. Active alcohol consumption was associated with female sex, preferential consumption at home, cannabis use, not attending telematic groups during lockdown, as well as higher current psychiatric comorbidity (Table 4).

There were 237 patients (77.7%) abstinent prior to the state of lockdown. When comparing the 23 patients who relapsed versus the 214 who remained abstinent, the results are similar to the previous ones. Relapse to drinking was associated with being female, the possibility of leaving home for work reasons, cannabis use, not being in group therapy, as well as a greater presence of psychopathology during lockdown (data not shown).

Of the 68 patients with active consumption prior to lockdown, 28 stopped drinking and 40 continued. Those who maintained their drinking were mostly at-home drinkers (n = 32, 91.4%, chi = 7.4, p = 0.007, OR = 6.4, CI = 1.5-27.1) and were not being treated with disulfiram (n = 37, 94.9 %, OR = 8.2, CI = 1.6-42.7).

In the analysis of the "new" patients, registered to start the programme but not yet included, there were 26 subjects, of which 19 were men. Of these, five (20%) showed a rise in consumption, in some cases quite considerable (one increased from 3 to 40 SDUs). Conversely, five other patients (20%) stopped drinking, with two having severe withdrawal syndrome. In addition, three patients (12%) reported drinking less, with some being solitary at-home drinkers and consumption falling due to greater supervision on the part of the spouse who was also confined to the home. Finally, 12 (48%) subjects did not report changes in consumption. Of these, 7 of 25 (28%) reported presenting psychopathological alterations due to lockdown, referring mainly to anxiety symptoms.

Covid-19 infections, hospital admissions and deaths

Test-confirmed Covid-19 infections were presented by 1.6% of the sample, and 3.6% reported Covid-19 compatible symptoms without taking a confirmatory test and were followed up by their primary care physician at home. Two patients were hospitalized for the disease. There were four deaths in the total sample during the months of assessment, one from Covid-19 infection and simultaneous decompensation of their liver disease, another two from liver disease without Covid-19 infection, and one patient with liver disease died of unknown causes (Table 1).

Psychopathological disorders related to Covid-19 infection were explored. Five patients reported no problems, three had anxiety, three depressive symptoms and one insomnia. Of these patients, three mourned the death of a relative, usually one of the parents.

Psychopathological disorders related to lockdown

Telephone interviews were used to assess the presence and type of psychopathological disorders reported by patients. Of these, 208 (68.4%) did not report serious psychopathological issues. Conversely, 96 (31.6%) reported various disorders, grouped according to the predominant symptom as: anxiety in 71 cases (23.4%), 12 cases of depression (3.9%), 8 of insomnia (2.6%) and 5 had a fear of falling ill (1.6%). Ten patients reported being in mourning for relatives who died from Covid-19.

Breaking down the symptoms reported by the 96 patients, the most frequent were anxiety symptoms (76

Table 1
Sample characteristics

		N = 311 (%)
Sex	Male	224 (72)
Age	Mean age (SD) [Range]	53.0 (9.8) [19-88 years]
	Median (IQR)	54 (11)
Marital status	Single	81 (26.7)
	Married	129 (42.6)
	Separated	85 (28.1)
	Widowed	8 (2.6)
Living arrangements	With own family	146 (48.2)
	With family of origin	75 (24.8)
	Alone	57 (18.8)
	Other	25 (8.2)
Education	None	6 (2)
	Primary	174 (58.6)
	Secondary	79 (26.6)
	University	38 (12.8)
Work situation prior to lockdown	Unemployed	77 (25.2)
	Occupational disability	81 (26.6)
	Active employment	77 (25.2)
	Retired	58 (29)
	Other	12 (3.9)
Work situation during lockdown	No change	267 (87.5)
	STW	9 (3.0)
	Teleworking	11 (3.6)
	Unemployed	16 (5.2)
	Other	2 (0.7)
Concomitant medical pathology	None	109 (37.6)
	Liver disease	99 (34.1)
	Pancreatitis	7 (2.4)
	Heart disease	14 (4.8)
	Respiratory pathology	4 (1.4)
	Neurological pathology	7 (3.4)
	Other	26 (9.0)
	Pluripathology	24 (8.3)
Current psychiatric comorbidity	None	118 (40.1)
	Mood disorders	54 (18.4)
	Anxiety disorders	19 (6.5)
	Psychosis	7 (2.4)
	Cognitive impairment	11 (3.7)
	Personality disorders	34 (11.6)
	ADHD	6 (2.0)
	Gambling	6 (2.0)
	Others	3 (1.0)
	Various	36 (12.2)
Current use of other drugs	Yes	182 (61.5)
	Tobacco	173 (58.6)
	Cannabis	19 (6.4)
	Cocaine	25 (8.4)
	Opioids	3 (1.0)
	Sedatives	8 (2.7)
	Others	2 (0.7)
Consumption pattern	Continuous	234 (79.1)
	Binge drinking	24 (8.1)
	Irregular	38 (12.8)
	Social	36 (12.8)
	Solitary	94 (33.5)
	Mixed	151 (53.7)
Preferred places of consumption	Bar	53 (19)
	At-home	77 (27.6)
	Outside	6 (2.2)
	Bar and home	99 (35.5)
	Bar and outside	17 (6.1)
	Home and outside	11 (3.9)
	Bar, home and outside	12 (4.3)
	Other	4 (1.4)
Number of SDUs pre-lockdown	Mean (SD) [Range]	1.95 (6.0) [0-50]
	Median (IQR)	0 (0)
Previous abstinence	Abstinent	237 (77.7)
	Drinking	68 (22.3)
Number of SDUs during lockdown	Mean (SD) [Range]	1.5 (5.3) [0-40]
	Median (IQR)	0 (0)
Abstinence post-lockdown	Abstinent	242 (79.3%)
	Drinking	63 (20.7%)
Usual number of SDUs before treatment	Mean (SD) [Range]	20.9 (14.7) [4-120]
	Median (IQR)	15 (20)
Current disulfiram treatment		138 (45.8)
In group therapy prior to lockdown		150 (48.3)
In video conference groups during lockdown		40 (13.3)
Time in treatment (months)	Mean (SD) [Range]	26.7 (24.6) [0-100]
	Median (IQR)	20 (35)
Covid-19 infection, hospital admissions and deaths	None	288 (94.7)
	Confirmed	5 (1.6)
	With symptons but no confirmatory test	11 (3.6)
		2 (0.7%)
	Admitted with Covid	5 (1.6%)
	Admitted for other reasons	4 (1.3%)
	Deaths during lockdown	
Isolation measures during lockdown	Not leaving home	268 (88.2)
	At home but able to leave for work reasons	30 (9.9)
	Other (hospitalization, quarantine at home)	6 (2.0)
Lockdown psychopathology	None	208 (68.4)
	Anxiety	71 (23.4)
	Depression	12 (3.9)
	Insomnia	8 (2.6)
	Fear of getting sick	5 (1.6)
Changes in consumption during lockdown*	No change	232 (76.1)
	Stopped drinking	28 (9.2)
	Started drinking	23 (7.5)
	Reduced drinking	10 (3.3)
	Increased drinking	9 (3.0)
	Substitute use of sedatives	3 (1.0)

Note. ADHD: Attention deficit hyperactivity disorder. IQR: Interquartile range. SD: standard deviation. SDU Standard Drink Unit. STW: short-time work.
*Six patients not included (4 due to death and 2 hospitalized during this period).

Table 2
Comparative study of changes in consumption during lockdown

		No change N = 232 (%)	**Increased drinking N = 32 (%)**	**Reduced drinking N = 38 (%)**	**X^2 or test used**	**p**
Age (in years)	Mean (SD) Median (IQR)	53.5 (9.2) 55 (11)	47.6 (11.7) 49 (12)	54.1 (10.9) 53 (14)	Kruskal-Wallis	0.06
Sex	Female	63 (27.2)	13 (40.6)	10 (26.3)	2.6	0.27
Education	None Primary Secondary University	4 (1.8) 137 (60.9) 60 (26.7) 24 (10.7)	0 (0) 13 (40.6) 10 (31.3) 9 (28.1)	2 (5.7) 21 (60.0) 7 (20.0) 5 (14.3)	12.4	0.05
Employment	Unemployed OD Working Retired Other	56 (24.3) 72 (31.3) 50 (21.8) 42 (18.3) 10 (4.3)	8 (25.0) 4 (12.5) 13 (40.7) 5 (15.6) 2 (6.3)	12 (31.6) 5 (13.2) 10 (26.3) 11 (28.9) 0 (0)	20.7	0.05
Consumption pattern	Continuous Binge Irregular	184 (82.1) 15 (6.7) 25 (11.2)	19 (59.4) 8 (18.8) 7 (21.9)	30 (81.1) 3 (8.1) 4 (10.8)	9.5	0.05
Consumption pattern	Social Solitary Mixed	30 (14.1) 60 (28.2) 123 (57.7)	2 (6.9) 14 (48.3) 13 (44.8)	4 (11.1) 18 (50.0) 14 (38.9)	10.3	0.035
On disulfiram treatment		115 (50.0)	14 (43.8)	8 (22.2)	9.7	0.008
In group therapy prior to lockdown		133 (65.5)	6 (25.0)	6 (20.0)	32.6	0.000
In video-conference groups during lockdown		35 (15.3)	2 (16.3)	2 (5.6)	4.07	0.1
Presence of psychopathology during lockdown		60 (25.9)	18 (56.3)	15 (40.5)	14.0	0.001
Current cannabis use		9 (4.0)	6 (20.0)	4 (11.4)	12.8	0.002
Current cocaine use		14 (6.1)	6 (20.0)	4 (11.4)	7.3	0.026

Note. IQR: interquartile range. OD: occupational disability. SD: standard deviation.

Table 3
Multinomial regression according to change in consumption during lockdown

						95% CI for OR	
Reference category: unchanged consumption		**Wald**	**df**	**p**	**OR**	**Lower limit**	**Upper limit**
Drinking more	Interceptation	0.004	1	0.95			
	Age	1.97	1	0.16	0.95	0.89	1.02
	Sex (male)	4.59	1	0.03	4.12	1.13	15.06
	In association groups (no)	5.72	1	0.02	0.07	0.01	0.62
	Psychopathological disorders due to lockdown (no)	5.42	1	0.02	4.13	1.25	13.61
	Cannabis (no)	7.09	1	0.01	17.04	2.11	137.33
	In group therapy (yes)	5.36	1	0.02	4.19	1.25	14.07
	Consumption pattern (binge)	6.32	1	0.01	0.15	0.03	0.66
	Consumption pattern (irregular)	0.78	1	0.37	0.40	0.05	3.02
	Consumption pattern (solitary)	1.08	1	0.30	0.31	0.03	2.82
	Consumption pattern (mixed)	0.51	1	0.47	1.59	0.45	5.62
	Secondary education	6.32	1	0.01	0.12	0.02	0.63
	University	4.45	1	0.03	0.16	0.03	0.88
Drinking less	Interceptation	0.000	1	0.99			
	Age	2.15	1	0.14	1.05	0.98	1.11
	Sex (Male)	1.26	1	0.26	0.44	0.11	1.83
	In association groups (no)	0.003	1	0.96	3.29E-6	4.08E-219	2.651E+207
	Psychopathological disorders due to lockdown (no)	3.83	1	0.05	3.14	1.00	9.90
	Cannabis (no)	15.46	1	0.00	88.01	9.44	820.30
	In group therapy (yes)	9.94	1	0.00	6.87	2.07	22.74
	Consumption pattern (binge)	0.01	1	0.93	0.92	0.14	6.08
	Consumption pattern (irregular)	0.98	1	0.32	0.23	0.01	4.15
	Consumption pattern (solitary)	2.65	1	0.10	3.51	0.77	15.94
	Consumption pattern (mixed)	4.06	1	0.04	4.48	1.04	19.25
	Primary education	0.01	1	0.90	0.84	0.04	15.52
	Secondary education	0.26	1	0.61	0.58	0.07	4.58
	University	0.44	1	0.51	0.48	0.06	4.12

Note. CI: confidence interval. df: degrees of freedom. OR: odds ratio;
Log likelihood = 190.12. Chi = 97.3. Gl = 22. P = 0.000. Cox and Snell pseudo R2 = 0.34.

Table 4
Regression model predicting consumption during lockdown

					95% CI for OR	
Variables (reference category)	**Wald**	**df**	**p**	**OR**	Lower	Upper
Sex (male)	3.26	1	0.07	2.17	0.93	5.05
Cannabis (no)	4.26	1	0.04	4.37	1.08	17.74
Mental disorder (no)	2.76	1	0.10	2.35	0.86	6.42
Groups (yes)	10.63	1	0.001	4.27	1.78	10.23
Place of consumption (outside)	4.41	1	0.04	3.02	1.08	8.47
Association groups (yes)	2.75	1	0.09	5.85	0.72	47.19
Constant	23.38	1	0.00	0.003		

Note. CI: confidence interval. df: degrees of freedom. OR: Odds ratio;
Percentage of correct corrections: 83.9%. Log likelihood = 158.6. Cox and Snell R2 = 0.17. Chi squared of the model = 44.3. gl = 6. P = 0.000.

Table 5
Presence of psychopathological disorders related to lockdown

		No psycho-pathology N = 208 (%)	Presence of psychopathology N = 96 (%)	X^2 or test used	p	*OR (95% CI)*
Age	Medians (IQR)	55 (11)	52 (11)	U Mann-Whitney	0.006	
	Female	48 (23.1)	38 (39.6)	8.8	0.003	2.2 (1.3-3.7)
Consumption pattern	Social Solitary Mixed	29 (15.3) 48 (25.3) 113 (59.5)	7 (7.8) 46 (51.1) 37 (41.1)	18.7	0.000	
Group therapy attendance		109 (61.9)	37 (44.6)	6.9	0.009	2.02 (1.2-3.4)
Psychiatric comorbidity	No Mood D Anxiety D Psychosis Cog Imp PD ADHD Gambling Other Various	102 (51.0) 34 (17.0) 4 (2.0) 6 (3.0) 10 (5.0) 23 (11.5) 5 (2.5) 3 (1.5) 2 (1.0) 11 (5.5)	14 (15.4) 20 (22.0) 15 (16.5) 1 (1.1) 1 (1.1) 10 (11.0) 1 (1.1) 3 (3.3) 1 (1.1) 25 (27.5)	70.3	0.000	
Presence of psychiatric comorbidity		98 (49.0)	77 (84.6)	33.1	0.000	5.7 (3.0-10.8)

Note. ADHD: Attention deficit hyperactivity disorder. CI: confidence interval. Cog Imp: cognitive impairment. D: disorder. IQR: interquartile range. OR: odds ratio. PD: personality disorder.

Table 6
Regression model predicting presence of psychopathology during lockdown

Variables	Wald	df	p	OR	95% CI for OR	
					Lower	Superior
Sex (male)	3.84	1	0.05	1.79	1.00	3.22
Mental disorder (no)	22.88	1	0.000	4.92	2.56	9.45
Change in consumption (1)	6.38	1	0.01	2.99	1.28	6.99
Change in consumption (2)	1.50	1	0.22	1.66	0.74	3.73
Constant	54.77	1	0.000	0.10		

Note. CI: confidence interval. df: degrees of freedom. OR: Odds ratio; Change in consumption (1): increased vs no change. Change in consumption (2): decreased vs no change.
Percentage of correct classifications: 71.2%. Log likelihood = 308.5. Cox and Snell R2 = 0.15. Chi squared of the model = 46.0.

cases), sometimes linked to conflict in living together or exacerbation of previous anxiety symptoms; depressive symptoms (including depressed mood, apathy or relapse into a depressive picture, in 25 cases), insomnia (29 subjects), fear of becoming infected (8), craving for alcohol (5), sudden mood swings (5), obsessive rumination (4), eating disorders (4), physical discomfort (4), hypochondriacal concerns (3), fear of going out (3), thoughts of death (2), lack of concentration (2), aggressiveness (2), visual illusions (1), ideas of harm (1) or clinical worsening after abandoning psychotropic drugs due to not going to the pharmacy (1).

The presence of psychopathological disorders due to lockdown was associated with being female, increased alcohol consumption and, mainly, with the presence of current psychiatric comorbidity (Tables 5 and 6).

Discussion

Our data would not lead us to conclude that lockdown is a risk factor for relapse in patients under treatment. Alcohol consumption remained stable among most of the patients and abstinence could be maintained. However, about a

quarter of participants presented changes in their drinking, either increasing or decreasing it, or taking advantage of the situation to quit drinking. Relapse was reported by 7.5% of patients during the three months of lockdown assessed. In general, it can be considered that there were few relapses in patients on stable treatment, but the number was possibly higher than usual, given that the percentage of relapses in our programme over the entire previous year was over 20% (unpublished data). As outlined above, the idea that addiction specialists transmitted through the media was that an increase in consumption was to be expected due to the stress of lockdown, with some going so far as to claim that the increase was very strong (news report, Redacción Médica, 2020). While it is possible that this is not the case for patients already in treatment, such an increase is possible in social drinkers or drinkers not considered to be problematic or addicted without treatment, or those drinking as a substitute for other addictions. Either way, lockdown has also been seen as reinforcing abstinence according to Alcoholics Anonymous (news report, El Progreso, 2020). In line with our data, a study of newly abstinent smokers in a smoking cessation programme in Lleida found that relapses did not significantly increase in lockdown, although it considered that smoking could increase in the non-abstinent (Ricou, 2020). A Chinese study with an online survey showed that during the Covid-19 pandemic in their country, 32% of alcohol users drank more and 19% of alcohol addicts relapsed (Sun et al., 2020). These figures are higher than ours, possibly pointing to differences between addicts in treatment and those in the general population.

Exposure to highly stressful situations such as terrorist attacks, natural disasters or accidents has been associated with an increase in the percentage of problems with alcohol use in some studies (Boscarino, Adams & Galea, 2006; Lebeaut, Tran & Vujanovic, 2020) but not in others (North, Kawasaki, Spitznagel & Hong, 2004; Shimizu et al., 2000). It is therefore essential to analyze which factors can determine the differences found in these studies. Exposure to SARS in China in 2003 led to a rise in alcohol-related problems and was associated with working as a health worker during the epidemic (Wu et al., 2008). A higher degree of exposure to the virus and needing to be isolated as a consequence of it were identified as risk factors. In addition, a dose-response relationship was identified between the intensity of exposure to the virus and symptoms of long-term alcohol addiction (Wu et al., 2008). However, in relation to the Covid-19 pandemic, the scarcity of data on the possible increase in consumption as a result of lockdown has been recognized (García-Álvarez, de la Fuente-Tomás, Sáiz, García-Portilla & Bobes, 2020).

Our research is thus pioneering in this regard, indicating that there are few relapses in patients under stable treatment and providing information on the most vulnerable subjects involved. Thus, drinking patterns, sex, the use of other drugs, psychiatric comorbidity and the type of treatment received are of relevance. Therefore, in similar situations of lockdown at home, special attention must be paid to those dependents on alcohol who are women, those with solitary and mainly at-home drinking or with non-daily drinking patterns or with concomitant use of other substances such as cannabis or cocaine, and also those with psychiatric comorbidity, mainly mood and anxiety disorders. In addition, patients in group treatment and those taking part in videoconference group therapy organised by self-help associations are less at risk of drinking in this situation, thus underlining the importance of establishing measures of this type, although it may also be a result of the selection of patients with a better prognosis due to greater motivation and involvement in treatment.

Curiously, some of these risk factors for increasing consumption also seem related to reduced drinking; thus, using cannabis and not being in group therapy were associated with a decrease, with no clear explanation for this situation. In any case, the patients who stopped drinking were those with who drank more outside the home. While the use of cannabis and cocaine was associated with both an increase and a decrease in drinking during the period analyzed, it was more linked to an increase and there were few subjects with concomitant alcohol use, as reflected in such wide OR confidence intervals.

Subjects who quit drinking also constitute a vulnerable population, given the risk of complications during withdrawal, aggravated by the difficulty of access to health services and fears regarding this issue. Thus, for example, two of our patients who were going to start treatment had severe withdrawal syndrome on abruptly quitting. Therefore, it is necessary to inform patients of this risk and have care resources available for these types of complications. The increase in severe withdrawal syndrome in this situation has been previously described (Narasimha et al., 2020).

The sample size does not allow us to conclude whether the number of Covid-19 infected and deaths is different from expected, but it seems that from a somatic point of view (liver disease), seriously ill patients may constitute a vulnerable population in these circumstances due to greater difficulties in accessing health services. In our case, the four deaths during this period were subjects with severe liver disease, although the high percentage of patients with this condition in our programme must be taken into account. In our sample, 5.2% had a Covid-19 infection or suggestive symptoms. Data from Madrid's health department on May 31, 2020, showed 308,110 patients under follow-up in the Community of Madrid for primary care due to possible Covid-19 and there were 9,064 deaths in hospitals for this reason (Dirección General de Salud Pública, 2020). Considering the total population of the Community of

Madrid, this would work out at a similar percentage to ours. However, our sample included a high percentage of subjects who did not have to leave for work reasons and, therefore, had low exposure.

Regarding the psychopathological disorders associated with lockdown in this population, it is necessary to highlight the close link between them and the presence of previous psychiatric comorbidity, rather than with other factors associated with alcohol use. Thus, the presence of psychiatric comorbidity points to another population group requiring more professional supervision due to greater vulnerability to complications in this situation. In any case, the increase in psychopathology was also associated with an increase in drinking, although we cannot establish whether one is the cause or the consequence of the other. They were also more frequent among women who, furthermore, had greater psychiatric comorbidity, greater solitary and at-home drinking, and a greater increase in consumption. Therefore, women are another population group with greater vulnerability in this situation.

The most frequent manifestations in our patients were anxiety symptoms. However, in a study carried out with a large sample of the general Spanish population, it was noted that during the first weeks of lockdown the most frequent emotional responses were depressive symptoms (46.7%) and, contrary to expectations, anxiety symptoms were the least frequent, affecting 6.1% of the population (García-Álvarez et al., 2020). We do not know if the responses of addicted individuals may be different from the rest of the non-addicted population, but it does not seem to be an adequate explanation of the discrepancy in the data. In addition, it has been pointed out that the psychological effects of lockdown appear to increase with the passing of time (García-Álvarez et al., 2020) and in certain vulnerable groups of the population, such as health personnel (Bai et al., 2004; Maunder et al., 2003), people with somatic diseases or people with a mental disorder, more specifically depression, anxiety or bipolar disorder (García-Álvarez et al., 2020). Similarly, substance use is also considered a factor of vulnerability (Pfefferbaum & North, 2020). It has been hypothesised that stress, depression, irritability, insomnia, fear, confusion, anger, frustration, boredom or stigma, would be among the most frequent responses to lockdown, and in addition, there is a concern that these symptoms may persist for a long time after the period of confinement (Brooks et al., 2020). It has also been pointed out that such measures could notably increase the risk of suicide in the population (García-Álvarez et al., 2020; Reger, Stanley & Joiner, 2020). Given the risk these manifestations entail, the importance of highlighting the need to increase resilience in order to face the stress caused by the epidemic has been pointed out and recommendations have been offered in this regard (Vinkers et al., 2020).

In sum, conclusions about levels of drinking in addicts or habitual drinkers without treatment cannot be drawn from the present data. It has been suggested that people subjected to stressful situations such as lockdown resort more frequently to substance use to alleviate negative emotions (García-Álvarez et al., 2020); however, we have no data in this regard. There is also no information on what may have occurred to alcohol consumption in the youngest population.

Care services for addicts must therefore take into account the most vulnerable subjects who may require more health care, such as patients with serious medical problems, severe addicts who want to stop using and worry about the risk of complicated withdrawal, addicts with fewer therapeutic resources to deal with risk situations who do not attend group therapy nor self-help groups, addicted women and alcohol-dependent women with psychiatric comorbidity who risk exacerbating their psychopathology.

Among the limitations of the study, it should be noted that the detection of drinking and relapses may be underestimated given that patients frequently conceal their drinking; nevertheless, relatives were also interviewed and when there were suspicious signs regarding consumption, the patient was asked to attend in person for a breathalyzer test and was personally reassessed during the months of May and June 2020. Furthermore, psychopathological assessment was by telephone interview without the use of standardized instruments, but with the purpose of assessing what the patient reported spontaneously. In addition, classifying patterns or places of consumption is complicated since there are no pure patterns, but rather the predominance of one type of consumption over another. Finally, it would be interesting to assess relapse risk during the process of restriction easing, something we observed while following up our patients but which was not analyzed. It is possible that the risk of relapse for patients in treatment may be greater in this period than during the lockdown period itself.

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Conflict of interests

The authors declare no conflicts of interest in relation to this study.

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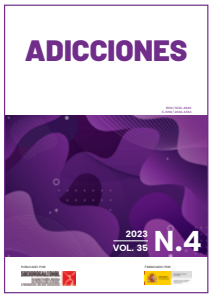

ORIGINAL

Understanding how alcohol environment influences youth drinking: A concept mapping study among university students

Influencia del entorno en el consumo de alcohol en jóvenes: Un estudio utilizando el concept mapping *con estudiantes universitarios*

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Abstract

The aim of the study was to identify the environmental factors that influence alcohol consumption, according to university students, and assess the relative importance and the frequency attributed to each factor. A study using Concept Mapping methodology was performed with a sample of nursing students, who participated in two face-to-face data collection sessions. In session 1, a consensus about the environmental aspects that influence their alcohol consumption was obtained. In session 2, the statements obtained were rated according to their relative importance and frequency in alcohol use (1 = *minimum*; 5 = *maximum*). Subsequently, all data were analyzed with the RCMAP of the statistical package R 3.6.1.

Resumen

El objetivo del estudio fue identificar los factores del entorno que influyen en el consumo de alcohol según la perspectiva de estudiantes universitarios, y evaluar la importancia y la frecuencia atribuida a cada factor. Se utilizó la metodología del *Concept Mapping* con una muestra de estudiantes de enfermería, que participaron en dos sesiones de recogida de datos. En la sesión 1, se obtuvo un consenso sobre los aspectos del entorno que influyen en su consumo de alcohol. En la sesión 2, los ítems obtenidos se clasificaron en función de la importancia y la frecuencia de estos factores en el consumo de alcohol (1 = mínimo; 5 = máximo). Todos los datos se analizaron con el RCMAP del paquete estadístico R 3.6.1.

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Approximately 60 students participated in each session. Most were women aged 20 to 24. In session 1, a total of 55 statements were obtained and classified into 7 different clusters: Advertising (9 statements); Family environment (4 statements); Social pressure (12 statements); Responsibilities/ norms (4 statements); Holidays and leisure time (7 statements); Emotional situations (8 statements); Accessibility (11 statements). Factors related to social pressure, holidays and leisure time, and alcohol accessibility were considered the most important and frequent in alcohol consumption. In contrast, alcohol advertising was considered the least important (mean 2.6 out of 5) and frequent (mean 2.1 out 5) factor. In conclusion, the factors considered most relevant among nursing students match those having more resources allocated for prevention and health promotion, except for alcohol advertising, which was perceived as less important and frequent compared with the other factors.

Key words: concept mapping, alcohol drinking, young adults, university student

Alrededor de 60 estudiantes participaron en cada sesión. La mayoría eran mujeres de 20 a 24 años. En la sesión 1, se obtuvieron un total de 55 ítems que fueron clasificados en 7 grupos: Publicidad (9 ítems); Ambiente familiar (4 ítems); Presión social (12 ítems); Responsabilidades/normas (4 ítems); Vacaciones y tiempo libre (7 ítems); Situaciones emocionales (8 ítems); Accesibilidad (11 ítems). Los factores relacionados con la presión social, las vacaciones y el tiempo libre y la accesibilidad del alcohol, fueron considerados los más importantes y frecuentes en el consumo de alcohol. Contrariamente, la publicidad del alcohol fue considerada el factor menos importante (media 2,6 sobre 5) y frecuente (media 2,1 sobre 5). En conclusión, los factores considerados más relevantes entre los estudiantes coinciden con los que se destinan más recursos para la prevención y la promoción de la salud, a excepción de la publicidad del alcohol, que se percibió como menos importante y frecuente comparado con los otros factores.

Palabras clave: *Concept Mapping*, consumo de bebidas alcohólicas, adultos jóvenes, estudiantes universitarios

Alcohol consumption is widespread in many countries, and common among different population groups. Adolescents and young adults may be considered a risk group for harmful alcohol consumption (Plan Nacional Sobre Drogas, 2021; World Health Organization, 2018). In Europe, the pattern of alcohol consumption has changed greatly over the past 30 years (Gordon, Heim & MacAskill, 2012). In Spain in particular, a traditional pattern of daily drinking, mainly during meals, evolved to episodic intensive consumption of alcohol during weekends (binge drinking), especially among young people (Galán, González & Valencia-Martín, 2014; Gordon et al., 2012). In fact, this drinking pattern peaks around 20 years of age and then tends to stabilize or decrease (Jackson, Sher, Cooper & Wood, 2002). For instance, in Spain the highest prevalence of binge drinking is observed between the ages of 20 and 24, both in women and men (Plan Nacional Sobre Drogas, 2021). This may be because many young people associate alcohol consumption with weekend nights, fun, and leisure (Pardo, 2002). This situation means that young people are disproportionately affected by acute intoxication and show a higher proportion of deaths attributed to alcohol consumption compared to older people (World Health Organization, 2018, 2019). Finally, alcohol use may be influenced by its wide availability, lack of recreational facilities and entertainment, normalization of drinking behaviours, and advertising and marketing (Bryden, Roberts, McKee & Petticrew, 2012; Muli & Lagan, 2017).

Various studies suggest that university students drink more than their non-university peers (Barnes, Welte, Hoffman & Tidwell, 2010; Quinn & Fromme, 2011). In Spain, 80-97.7% of university students reported alcohol use (Cortés Tomás, Espejo Tort & Giménez Costa, 2007; Moreno-Gómez et al., 2012), and 50.9% had binged in the month prior to their interview (Varela-Mato, Cancela, Ayan, Martín & Molina, 2012). Among university students, alcohol use may be promoted by increased freedom, feeling that university is a "time out" between adolescence and adulthood, and the peer environment (Bulmer et al., 2016; Caamaño-Isorna, Corral, Parada & Cadaveira, 2008; Colby, Colby & Raymond, 2009; Merrill & Carey, 2016; Mota et al., 2010; Wicki, Kuntsche & Gmel, 2010). Other factors influencing alcohol use among university students include gender (Gaete & Araya, 2017; Mota et al., 2010; Wicki et al., 2010), age of drinking onset (Caamaño-Isorna et al., 2008; Gaete & Araya, 2017; Mota et al., 2010; Wicki et al., 2010), pocket money (Barry & Goodson, 2012; Gaete & Araya, 2017), expectations about alcohol use, e.g. a way to release from stress and from daily and academic activities, and a social facilitator (Bulmer et al., 2016; Caamaño-Isorna et al., 2008; Colby et al., 2009; Dodd, Glassman, Arthur, Webb & Miller, 2010; Merrill & Carey, 2016; Mota et al., 2010), personality traits (e.g. impulsivity and sensation-seeking), and negative emotional states (Barry & Goodson, 2012; Merrill & Carey, 2016; Muli & Lagan, 2017).

However, most studies exploring factors associated to alcohol drinking among university students are from North America, and much less is known about the perspective of university students in Europe. Besides, these studies seldom consider contextual factors such as alcohol advertising, availability and accessibility or the high presence of alcohol where people live, factors that may influence alcohol drinking behaviours (Bryden et al., 2012; Ellickson, Collins, Hambarsoomians & McCaffrey, 2005; Jernigan, Noel, Landon, Thornton & Lobstein, 2017; Mori-Gamarra et al., 2018; Sureda, Villalbí, Espelt & Franco, 2017b).

Techniques such as Concept Mapping (CM) were used in other studies to explore the different effects of alcohol use (Windsor, 2013). CM is a mixed methodology that combines a qualitative approach with a quantitative analysis. The aim is to translate complex qualitative data into a pictorial form (concept maps), which displays the interrelationships between ideas in the form of clusters (Burke et al., 2005; Trochim, 1989). Specifically, CM

methodology integrates group processes of generating ideas, such as brainstorming and unstructured sorting, with multivariate statistical techniques of multidimensional scaling, and with hierarchical cluster analysis. The two aims of this study were: 1) to identify the environmental factors that influence alcohol consumption among university students in Spain; 2) to assess the importance and frequency of each environmental factor, using concept mapping.

Methods

This study is framed within the research lines of the Fundació Universitària del Bages (FUB), Manresa campus of the University of Vic-Central University of Catalonia (UVic-UCC), which has passed the necessary methodological and ethical requirements and has been positively evaluated by the Scientific Research Committee of the Research and Innovation Department of the FUB, certifying its suitability and scientific quality.

In this study, we used concept mapping (Burke et al., 2005; Trochim, 1989). A convenience sample of students participated in two face-to-face sessions between April and June 2019. Students were from the Degree of Nursing of the the Faculty of Health Sciences of Manresa of the UVic-UCC, Spain. We carried out the collecting sessions during two hours of class. 59 out of 71 nursing students enrolled in the first data collection session, and 58 in the second session, with a participation rate of 83.1% and 81.7%, respectively. Attendance to class on the study days was similar to that observed throughout the semester.

Data collection and analysis

CM is a methodology consisting of six major steps (Burke et al., 2005; Trochim, 1989), which we carried out as follows.

Preparation (step 1). Researchers established the research focus question, and identified and selected the group of participants. The focus question was "What aspects of your environment influence your alcohol consumption?". The aim of this step was to obtain the maximum number of statements related to the environment that influence alcohol consumption in young people, regardless of whether the interviewee was a drinker or not. Therefore, we asked those who did not consume alcohol to think about the factors that influence young people in general. All students in the third-year nursing classrooms course were invited to participate, and those who agreed were asked to sign an informed consent form.

Generation of statements (step 2 and data collection session 1). To facilitate students' participation in generating statements, we randomly divided students from each of the two classrooms of the nursing course into two subgroups of 12-15 students. In each group, a 45-minute brainstorming session was performed to obtain statements based on the focus group question. Participants also responded to a brief survey on demographic and alcohol-related variables. Alcohol-related variables were collected using the Alcohol Use Disorders Identification Test Consumption (AUDIT-C), a brief alcohol screening instrument with three questions on the frequency and amount of alcohol consumption and the frequency of binge drinking in the last year. This brief screening test has been shown to be effective in detecting hazardous drinkers in university students (from 3 points in women and 4 points in men) (García Carretero, Novalbos Ruiz, Martínez Delgado & O'Ferrall González, 2016). After this session, two researchers revised the statements of the four groups to eliminate duplicates, and grouped together similar statements. Researchers independently performed this revision process and then compared their results (triangulation of researchers). A third researcher intervened when there were discrepancies. Finally, we compiled a list of the statements from the four groups, so that the participants could sort them in the next step.

Data sorting and rating (step 3 and data collection session 2). In this step, all procedures were carried out individually. First, each participant classified the statements from the final list into groups that made sense to him/her, and named each group. Participants were free to use as many groups as necessary. Nevertheless, it was indicated that every group had to contain at least two statements and each statement had only to be in one group. After that, participants rated each statement using a 5-point Likert scale according to two criteria: 1) the importance of the factor in alcohol consumption (1 being very low, and 5 being very high); and 2) the frequency at which they encounter these factors or situations (being 1 never and 5 always).

Representation of statements in maps (step 4). We introduced all data obtained in the previous steps into a software package R-CMap (https://haim-bar.uconn.edu/software/R-CMap/). In this way, we obtained different outputs with statistical techniques: 1) point maps indicating the degree of closeness between statements indicated by each student in step 3 (Kruskal and Wish stress index was calculated to evaluate the goodness of fit of the resulting maps); 2) cluster maps to structure the point maps and better interpret the results; 3) ranking the statements and clusters calculated based on the average scores for each criterion (importance and frequency); and 4) scatter plots (go-zone) of rating scores. We calculated Spearman correlations, and divided the statements in four quadrants, based on the mean of each criterion.

Interpretation of maps (steps 5 and 6). First, researchers discussed and interpreted the cluster maps obtained in the previous step. Second, they chose the cluster map that best represented a single concept without losing relevant information. They used a backward process starting with a high number of clusters. Finally, the research team named each cluster based on the names proposed by participants in step 3.

Results

Description of participants

A total of 59 nursing students participated in session 1, whereas 58 participated to session 2. As shown in table 1, we did not observe any statistically significant differences between participants of the two sessions. Most participants were women, aged 20 to 24 years, living with their families, and studying and working at the time of the study. Around half of the participants in each session had binge drank (consumed ≥6 drinks on one occasion) at least once in the previous year (Babor, Higgins-Biddle, Saunders & Monteiro, 2001). Moreover, one out of three students were hazardous drinkers according to the AUDIT-C test (García Carretero et al., 2016).

Statements and clusters

We obtained a final list of 55 statements from the four brainstorming session groups (session 1). As shown in table 3, statement 38, "Local or popular festivals (*Patum, Chupinazo, Fallas*, etc.)", had the highest mean score in both importance and frequency. Other statements in the go-zone (i.e., importance and frequency higher than the mean, figure 1), were: 1) 3, "Partying with friends/university parties"; 2) 22, "Concerts or festivals"; 3) 46, "Easy access to alcohol (extensive purchase places and hours, many places to buy, easy to get, alcohol is everywhere)"; and 4) 52, "Compulsory consumption in nightclubs". Conversely, statement 33, "Songs related to alcohol consumption", had the lowest mean score for importance, and statement 8, "To obtain sex", had the lowest mean score for frequency.

According to the participants' indications, the research team chose a final map of 7 clusters to group the statements (figure 2): 1) "Advertising" (9 statements); 2) "Family environment" (4 statements); 3) "Social pressure" (12 statements); 4) "Responsibility/norms" (4 statements); 5) "Holidays and leisure time" (7 statements); 6) "Emotional situations/ emotional status" (8 statements); and 7) "Accessibility" (11 statements). The stress index of the point plot was 0.307, which suggest that clusters in this study have a good fit (Kane & Trochim, 2007). In general, the mean scores of the clusters related to the importance criterion were higher than those related to frequency. In addition, the average score was very similar among most of the clusters, in both importance and frequency criteria. Nevertheless, students perceived cluster 4, "Responsibility/norms", as the most important (mean score of 3.7), and cluster 7, "Accessibility", as the most frequent (mean score of 3.0). Moreover, clusters 7 ("Accessibility"), 5 ("Holidays and leisure time"), and 3 ("Social pressure") scored as the most important and the most frequent. Means of importance were 3.5, 3.4, and 3.4, respectively; means of frequency were 3.0, 2.8, and 2.7, respectively. Cluster 1, "Advertisement" was considered as the least important and least frequent, with mean scores of 2.6 and 2.1, respectively (tables 2 and 3). The correlation between importance and frequency was 0.74 for the statements and 0.78 for the clusters. Cluster 7, "Accessibility", had the highest positive correlation between importance and frequency (r = 0.90), followed by clusters 6, "Emotional situations/emotional status" (r = 0.87), and 5, "Holidays and leisure time" (r = 0.86). No negative correlations were obtained. However, the mean score of frequency was below the mean in cluster 6, "Emotional situations/Emotional status", in cluster 4, "Responsibility/ norms", and in cluster 2, "Family environment". Therefore, these clusters were considered important but infrequent (figure 1 and figure 3 for the go-zone of rating scores of each cluster independently).

Table 1
Characteristics of study participants: School of Nursing students. UVic-UCC, 2019

	Session 1 (n = 59)		Session 2 (n = 58)		*p*-value
	n	%	n	%	
Sex					
Women	48	81.4	51	87.9	
Men	11	18.6	7	12.1	0.324
Age					
20-24 years	43	72.9	42	72.4	
25-29 years	13	22.0	11	19.0	
30-35 years	3	5.1	5	8.6	0.775
Living arrangements					
Alone	4	6.8	5	8.6	
Parental family	37	62.7	35	60.4	
Peers (friends, student residence or flat)	13	22.0	12	20.7	
Partner	5	8.5	6	10.3	0.962
Employment status					
Only studying	20	33.9	17	29.3	
Studying and working	39	66.1	40	70.0	
Other	0	0	1	1.7	0.692
Self-perceived health					
Good or very good	52	88.1	50	86.2	
Fair, poor or very poor	7	11.9	8	13.8	0.755
Binge drinking					
Never	31	52.5	31	53.4	
Less than monthly	19	32.2	19	32.8	
Monthly or more	9	15.3	8	13.8	0.975
Hazardous drinking (Audit-C)					
Yes	19	32.2	20	34.5	
No	40	67.8	38	65.5	0.794

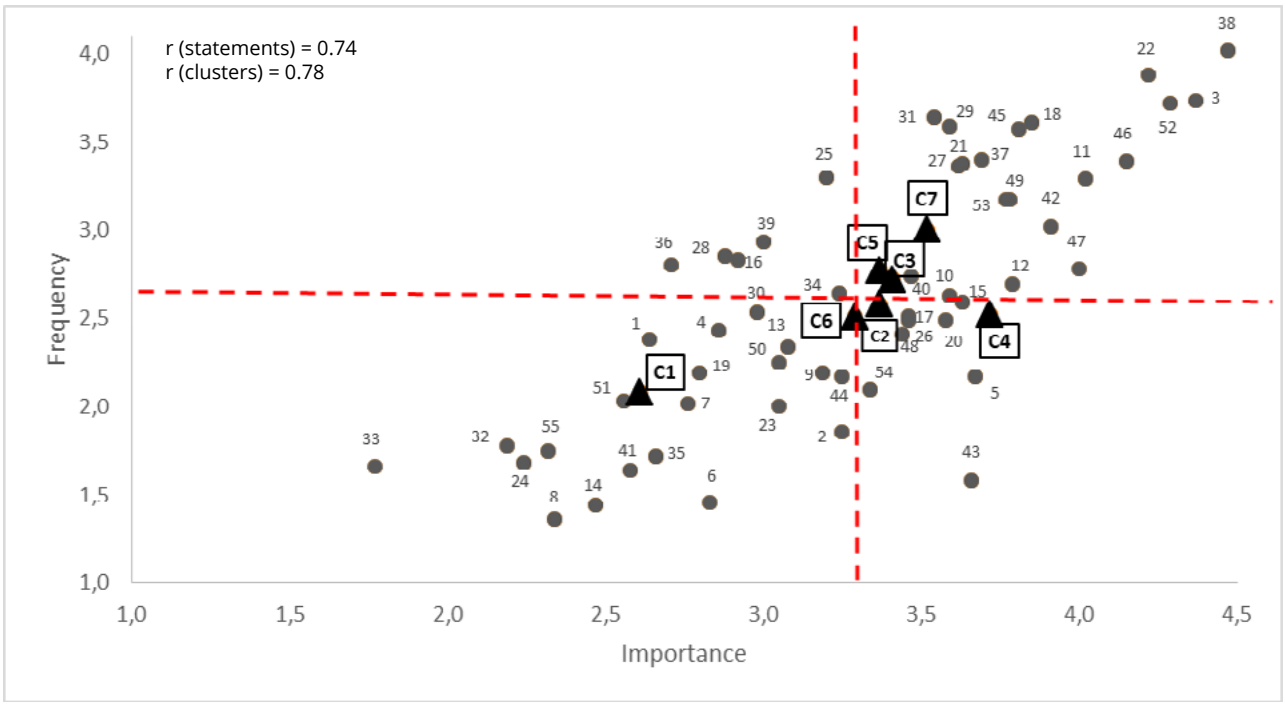
Table 2
Statements, clusters 1-3 and their scores based on criteria of importance (from 1 very low; to 5 very high) and frequency (from 1 never; to 5 always)

ID	Statement	Importance		Frequency	
		Mean	SD	Mean	SD
	Cluster 1: Advertising	**2.61**	**0.39**	**2.08**	**0.30**
1	Social networks (when you see pictures or videos of people who are drinking)	2.64	1.17	2.38	1.34
4	Availability of public transport	2.86	1.32	2.43	1.37
7	Drinks that are fashionable or that look good (gintonic, mojito, etc.)	2.76	1.02	2.02	1.01
13	Lack of alternative leisure activities to alcohol consumption	3.08	1.36	2.34	1.31
19	Subliminal advertising of alcohol consumption (alcohol in movies, series, sponsored sporting events, etc.)	2.80	1.10	2.19	1.36
33	Songs related to alcohol consumption	1.77	1.01	1.66	1.11
35	Positive messages related to alcohol (e.g., a glass of wine a day is good for health, beer is a natural drink, etc.)	2.66	1.25	1.72	0.93
51	Alcohol advertisements (TV, radio, bus canopies, billboards, internet, etc.)	2.56	1.10	2.03	1.21
55	Catchy slogans of alcoholic drinks which are repeated	2.32	0.97	1.75	0.96
	Cluster 2: Family environment	**3.37**	**0.28**	**2.58**	**0.62**
2	Parents and other family members who promote drinking	3.25	1.25	1.86	1.04
21	Family celebrations and special events (Christmas, Easter, carnival, birthdays, weddings, communions, etc.)	3.63	1.08	3.38	1.04
26	Family permissiveness toward drinking alcohol	3.46	1.09	2.49	1.37
30	Family habits or traditions related to alcohol consumption	2.98	1.00	2.53	1.21
	Cluster 3: Social pressure	**3.41**	**0.57**	**2.72**	**0.62**
3	Partying with friends/university parties	4.37	1.00	3.73	1.11
9	Associations or young clubs	3.19	1.15	2.19	1.41
17	Being pressured by friends who are drinking (through WhatsApp), inviting you	3.46	1.21	2.51	1.19
20	Student apartments	3.58	1.09	2.49	1.51
23	Not living with parents or relatives	3.05	1.18	2.00	1.38
31	Go out for a drink (go out for a drink, go for a beer, etc.)	3.54	1.02	3.64	0.92
32	Partner	2.19	1.11	1.78	0.97
36	Climate	2.71	1.18	2.80	1.23
37	Friends paying rounds of drinks or shots	3.69	0.95	3.40	1.08
40	Alcohol drinking games	3.47	1.34	2.74	1.22
47	Social pressure from the environment	4.00	1.19	2.78	1.31
48	Pressure from friends over WhatsApp to meet to drink	3.44	1.07	2.41	1.19

Table 3
Statements, clusters 4-7 and their scores based on criteria of importance (from 1 very low; to 5 very high) and frequency (from 1 never; to 5 always)

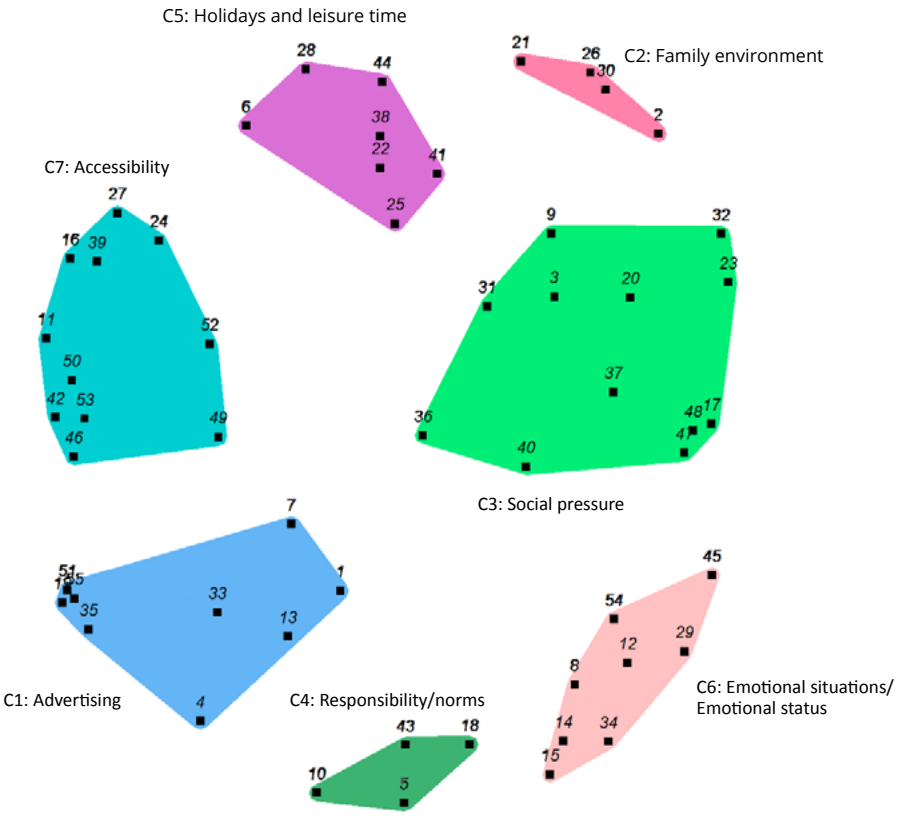
ID	Statement	Importance		Frequency	
		Mean	SD	Mean	SD
	Cluster 4: Responsibility/norms	**3.72**	**0.13**	**2.52**	**0.87**
5	Low perception of the risks of alcohol consumption	3.67	1.23	2.17	1.19
10	Knowing/thinking that there will be no police checkpoints	3.59	1.24	2.63	1.43
18	No next day responsibilities (having the day off from work or college, not having to take care of family members, etc.)	3.85	1.20	3.61	1.20
43	Use of other drugs	3.66	1.47	1.58	1.07
	Cluster 5: Holidays and leisure time	**3.37**	**0.72**	**2.77**	**1.04**
6	Workplace (hostelry, nightlife, etc.)	2.83	1.07	1.46	0.82
22	Concerts or festivals	4.22	0.94	3.88	1.03
25	Dinner outside the home	3.20	0.92	3.30	0.96
28	Gastronomic traditions and Mediterranean diet (drink wine with meals, use wine for cooking, etc.)	2.88	1.08	2.85	1.06
38	Local or popular festivals (patum, chupinazo, fallas, etc.)	4.47	0.71	4.02	1.25
41	Going to watch football or other sports	2.58	1.28	1.64	1.00
44	Going on holiday or traveling to places associated with drinking (Belgium, la Rioja, Basque Country, Eivissa, etc.)	3.25	1.15	2.17	1.04
	Cluster 6: Emotional situations/ Emotional status	**3.29**	**0.58**	**2.51**	**0.85**
8	To obtain sex	2.34	1.33	1.36	0.66
12	To get uninhibited and socialize	3.79	1.00	2.69	1.16
14	Willing to infringe established rules	2.47	1.13	1.44	0.82
15	Emotional situation (mood, personal problems, difficulty managing problems, etc.)	3.63	1.17	2.59	1.26
29	To disconnect or have a break, release stress (weekends, after a period of exams, etc.)	3.59	1.08	3.59	1.12
34	Desire to experience or live the moment	3.24	1.20	2.64	1.24
45	Good news and wish to celebrate (victory or triumph, finishing school year or exams, etc.)	3.81	1.01	3.57	1.04
54	To feel good in a place or environment	3.34	1.14	2.10	1.20
	Cluster 7: Accessibility	**3.52**	**0.63**	**3.00**	**0.58**
11	Alcohol promotions in bars, discos and restaurants (2x1, happy hour, drink included with entrance free, "tapa" + drink offer, etc.)	4.02	0.86	3.29	0.93
16	Restaurants that offer you a free shot after the meal	2.92	1.16	2.83	1.31
24	University bar that sells alcoholic drinks	2.24	1.10	1.68	1.11
27	Premises leading to drinking alcohol (beach bars, musical bars, terraces)	3.62	1.04	3.36	0.92
39	Restaurant and bar menus that include alcohol	3.00	1.09	2.93	1.31
42	Cheap price of alcohol compared to other beverages, in the leisure venues (bars, pubs, discos, etc.)	3.91	0.98	3.02	1.20
46	Ease of access to alcohol (extensive purchase hours, many places to buy, easy to get, alcohol is everywhere)	4.15	1.03	3.39	1.14
49	Extensive nightlife opening hours	3.78	1.05	3.17	1.18
50	Supply of alcoholic drinks on the street (street vendors of beer, etc.)	3.05	1.23	2.25	1.12
52	Compulsory consumption in nightclubs	4.29	0.79	3.72	1.27
53	Low price of alcohol	3.77	1.02	3.17	1.14

Figure 1
Scatter plots (go-zone)



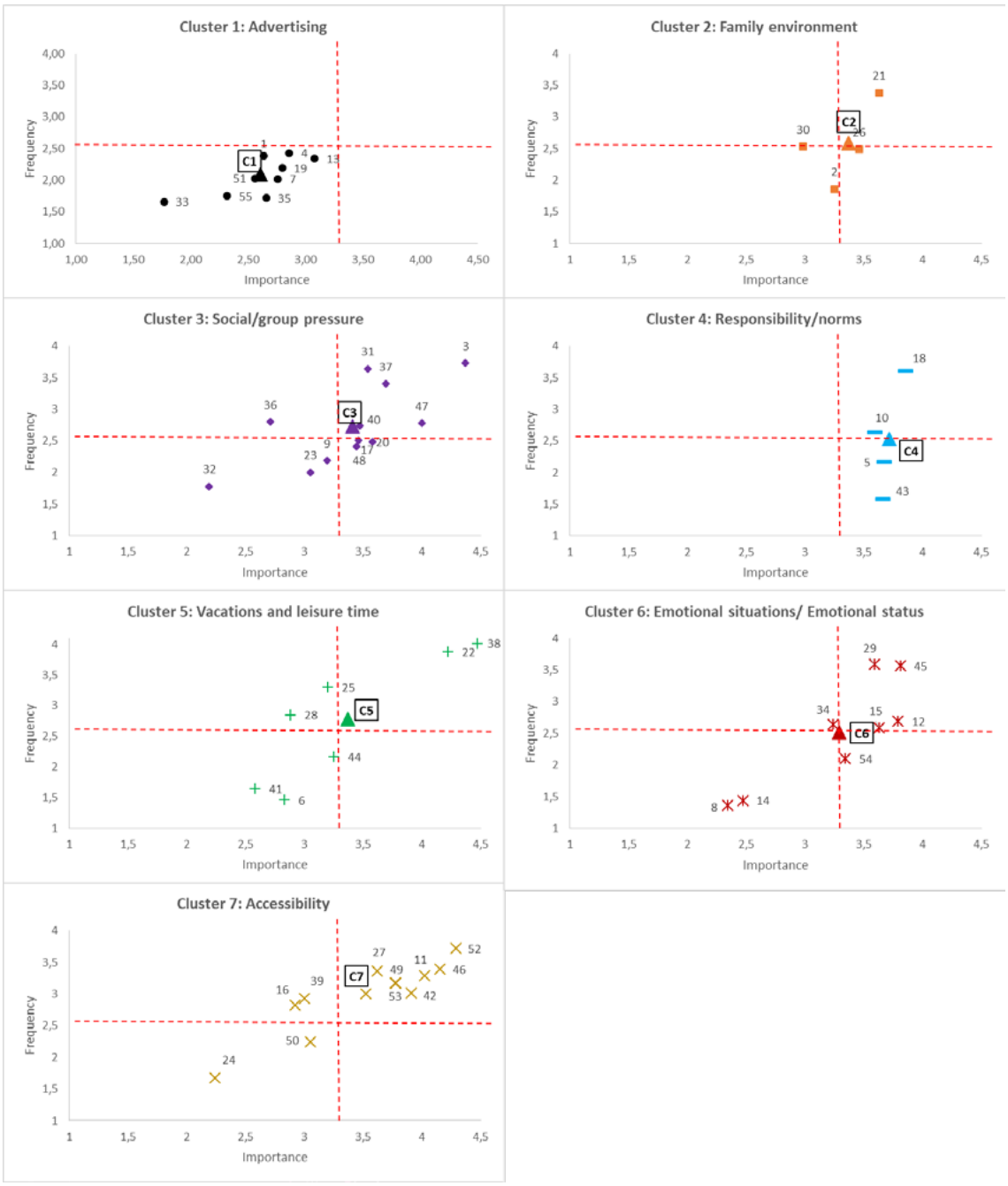
Note. Go-zone of rating scores. Point for statements and triangle for the average of the cluster. C1=average score of cluster 1; C2=average score of cluster 2; C3=average score of cluster 3; C4=average score of cluster 4; C5=average score of cluster 5; C6=average score of cluster 6; C7=average score of cluster 7.

Figure 2
Final Clusters map



Note. These 7 clusters are comprised of the 55 statements generated in the brainstorming session (step 2; session 1). The numbers within the clusters correspond to the statement number. The clusters name was based upon participants suggestions. Statements in close proximity to each other are conceptually closer than statements which are further apart. The closeness is based on the individual sorting of students (step 3; session 2).

Figure 3
Go-zone of rating scores for each cluster independently



Note. C1=average score of cluster 1; C2=average score of cluster 2; C3=average score of cluster 3; C4=average score of cluster 4; C5=average score of cluster 5; C6=average score of cluster 6; C7=average score of cluster 7.

Discussion

We used mixed methods (CM) to identify environmental factors related to students' alcohol consumption. The students identified seven groups of environmental factors. The most important and frequent factors were related to social pressure, holidays and leisure time, and alcohol accessibility (clusters 3, 5 and 7). In contrast, alcohol-related advertisement (cluster 1) was considered the least important and least frequent. In general, there was a positive linear correlation between the score of importance and the score of frequency in all the statements.

Social pressure

In line with previous studies, our results suggest that social pressure is an important factor influencing alcohol drinking among university students (Barry & Goodson,

2012; Borsari & Carey, 2001; Gaete & Araya, 2017; Muli & Lagan, 2017). Peer environment may contribute to risky alcohol consumption through different mechanisms, such as 1) direct influences (overt offers of alcoholic beverages); 2) modelling (imitation of others' behaviour), and 3) perceived drinking norms among peers (Borsari & Carey, 2001). In some statements, study participants indicated direct influences as a key factor for promoting youth drinking. Such influences included friends paying for drinks or friends inviting one to drink through WhatsApp. Also, a previous study described the popularity of drinking-related chatter on Twitter, and the positive view toward alcohol use in drinking-related Tweets (Cavazos-Rehg, Krauss, Sowles & Bierut, 2015). Other statements from the social pressure cluster, such as university parties and drinking games, may involve the three routes of peer pressure indicated above. In this regard, students are known to consume high amounts of alcohol at university parties. For example, an American study found that over 50% of students reported drinking to intoxication the last time they attended a university party (Marzell, Bavarian, Paschall, Mair & Saltz, 2015). A review showed that drinking games are common in university campuses and some students felt pressured to play or pressured someone else to play (Zamboanga et al., 2014).

Holidays and leisure time

In this cluster, we identified "concerts or festivals" and "local or popular festivals" as the most important and frequent statements for students' alcohol consumption. This view coincides with other studies conducted in drinking environments, such as festivals and nightlife places, which reported that most people in these places consumed alcohol and a significant proportion of them were highly intoxicated (Feltmann, Elgán & Gripenberg, 2019; Hughes et al., 2011). Similarly, in this group of factors, it seems that the main reason for drinking is to have fun, which is one of the main reasons for drinking among university students as also described in other studies (Dodd et al., 2010). In agreement with this, other studies indicate that alcohol drinking is highly normalized in our society. It is considered a part of our culture and customs, and it is usually associated with fun and good times, such as celebrations, meetings with friends, and leisure time (Pons & Buelga, 2011; Suárez, Del Moral, Martínez, John, & Musitu, 2016). Another social aspect that is indicative of the participants' view is the need to differentiate between typical drinking and drinking in special occasions (holidays, sporting events, celebrations, birthdays, etc.). When drinking in special occasions, it seems that either the typical weekly alcohol consumption significantly increases (Bellis et al., 2015), or the standard binge drinking threshold doubles or even triples (Patrick & Azar, 2018).

Alcohol accessibility

Participants identified alcohol availability and accessibility as aspects of their environment that influence their alcohol consumption. These aspects include offers and promotions in bars and restaurants, the low price of alcohol, and extensive purchase hours, and may increase normalization and social acceptance of alcohol. Several Spanish studies confirm this students' perspective, reporting a high availability of alcohol in urban environments (Sureda et al., 2018; Sureda et al., 2017b; Villalbí et al., 2019). In addition, international studies showed that the number of alcohol outlets, and hours and days of sale had an impact on different alcohol-related variables (Lu, Zhang, Holt, Kanny & Croft, 2018; Popova, Giesbrecht, Bekmuradov & Patra, 2009). Finally, an American study was conducted in different university campuses and found that alcohol specials, promotions, and advertisements were prevalent in the alcohol outlets around campuses. This was because campus environments are associated with higher binge-drinking rates (Kuo, Wechsler, Greenberg & Lee, 2003). Three different mechanisms were suggested for how higher availability of alcohol and accessibility to alcohol outlets may increase consumption: (i) by providing a more competitive local market, which can lower the price of alcohol products; (ii) by offering more opportunities for alcohol promotion (alcohol can be promoted in alcohol outlets); (iii) by affecting social norms related to alcohol consumption, turning it into a more acceptable practice (Sureda, et al., 2017a).

Alcohol-related advertising

Students participating in the study had a perspective that was different from the growing evidence on the effects of alcohol advertising exposure on alcohol-related behaviours. In Spain, alcohol advertising is widespread (Pastor et al., 2020) and people may underestimate its actual influence in their behaviour. For example, in Barcelona, 61% of on-premises alcohol establishments with terraces had alcohol marketing items. Moreover, 91% of off-premises establishments had items that can be considered stimuli for selling or consuming alcohol beverages (Villalbí et al., 2019). Also, adolescents and young adults are highly exposed to alcohol marketing, especially digital marketing (e.g. Twitter, Facebook, and Instagram) (Barry et al., 2016; Jackson, Janssen & Gabrielli, 2018). In turn, alcohol marketing has been associated with different alcohol-related behaviours, such as drinking initiation, and risky drinking in young people (Anderson, de Bruijn, Angus, Gordon & Hastings, 2009; Jackson et al., 2018), and in university students in particular (Hoffman, Pinkleton, Weintraub Austin & Reyes-Velázquez, 2014). It seems that alcohol advertising activates the brain's reward system in a way that motivates drinking (Courtney, Rapuano, Sargent, Heatherton & Kelley, 2018). Nevertheless, advertising may not only influence dinking but also attitudes, social norms, and knowledge and awareness of

alcohol effects (Petticrew et al., 2016). However, participants in the study did not perceive alcohol advertising as an important and frequent aspect influencing their drinking behaviour. A possible explanation for this result could be that from childhood, young people perceive alcohol drinking as something completely normal and related to social relationships, fun, and celebrations, and this same message is received from alcoholic beverage advertising (Pons & Buelga, 2011). Moreover, brands of alcoholic beverages use multiple strategies to get integrated into the daily lives and lifestyles of users and to become part of their identity (Jernigan, 2009; Lobstein, Landon, Thornton & Jernigan, 2017). Many of these marketing strategies do not necessarily consist of messages that explicitly refer to and suggest alcohol consumption. For instance, in digital marketing, a broader brand-focused conversation is encouraged and interactive material is developed to attract attention and promote discussions on alcohol-related behaviours.

Limitations of the study

Some limitations of this work must be recognized. First, we selected a convenience sample of nursing students that was predominantly female, due to the female/male ratios in this field. Thus, statements such as "to obtain sex" or "the partner" may be sensitive to the fact that the study sample consisted mainly of women. It is possible that students attending health-related courses have a greater awareness of factors related to behaviours affecting health, such as alcohol consumption. However, this greater awareness may provide a more accurate picture of factors influencing youth drinking. On the other hand, it seems that there are no statistically significant differences between the prevalence of binge drinking in Spanish university students from health-related fields (including nursing) and students from other disciplines (Varela-Mato et al., 2012). In fact, although health sciences students are more aware of health risk behaviours than other students, this does not appear to influence actual health risk behaviours (Peltzer, Pengpid, Yung, Aounallah-Skhiri & Rehman, 2016). Second, it was not possible to discuss the maps obtained in step 4 with the participants, because of organisational issues. Nevertheless, researchers from sessions 1 and 2 discussed and chose the cluster map that best represented the ideas and the individually made groupings. This process led to unanimous agreement among researchers. Finally, CM does not allow one to form clusters with a single statement, and it may be that some statements cannot be easily grouped. In this sense, the statements "Availability of public transport" and "Lack of alternative leisure activities to alcohol consumption" are included in cluster 1, but they do not seem to be representative of this group. Nevertheless, in relation to the latter, it is possible that students have associated common leisure activities, such as concerts or festivals, with alcoholic beverages brands sponsoring them.

Implication for Public Health policies

This study identified several factors that influence young people's drinking. The main environmental factors were: peer pressure, accessibility and availability, and using alcohol as a way to have fun. These factors should be taken into consideration when designing interventions and policy measures that target young people's drinking. Indeed, several studies showed that restricting the availability of alcohol and accessibility to it, can be effective in reducing its consumption and alcohol-related harm (Allamani, 2018; Villalbí, Bosque-Prous, Gili-Miner, Espelt & Brugal, 2014). Thus, the point of view of young people should be taken into account, not only for identifying factors that influence their drinking behaviour, but also for designing strategies to prevent alcohol use among them. Likewise, it would be interesting to develop promotion and prevention strategies to reduce alcohol drinking in situations and places where young people say they drink alcohol, such as concerts, parties, and festivals. In this sense, in Spain there are already some programs targeting alcohol drinking in nightlife settings, such as "Q de Festa" in Catalonia (https://www.qdefesta.cat) or "Piensa la noche" in la Rioja (https://www.infodrogas.org).

Although study participants identified advertising as a relevant factor, they attributed less frequency and importance to it, compared to the other identified factors. Nevertheless, evidence indicates that advertising regulation is an effective measure to reduce alcohol use and related harm (Allamani, 2018; Villalbí et al., 2014). Therefore, potential underestimation of advertisings' influence should be taken into account when designing interventions targeting young people's drinking. Finally, unforeseen circumstances may occur that change the factors influencing young people's drinking. For example, after the extreme confinement due to the COVID-19 pandemic, as nightlife settings were locked, there was an increase in the practice of "botellones" (drinking alcohol in groups in open areas, such as squares or parks) in Spain.

Conclusions

The use of CM methodology made it possible to quickly capture the students' perspective in a field as complex as alcohol consumption, and to obtain specific information that allows prioritizing areas of intervention. Peer pressure, alcohol accessibility and availability, and using alcohol as a way to have fun were identified as the most important and frequent factors for the participants' alcohol consumption. Conversely, alcohol-related advertisement was considered the least important and least frequent factor, compared to the other identified factors. These results suggest priority areas for further development of public health measures related to alcohol consumption in young adult populations.

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Conflict of interests

The authors have no conflicts of interest to report, financial or otherwise. Albert Espelt is Associate Editor of the journal Adicciones. However, this played no role in the editorial process.

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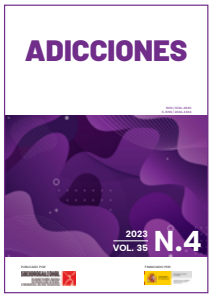

ORIGINAL

Internet use and abuse in the adult population of Galicia: Prevalence and associated characteristics

Uso y abuso de Internet en la población adulta de Galicia: Prevalencia y características asociadas

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Abstract

Internet use has rapidly spread around the world becoming an indispensable part of daily life. Despite its advantages, the dysfunctional use or abuse of the Internet can lead to addiction problems. The main objectives established in this study were to assess the prevalence of Internet use in the general Galician population and the prevalence of problematic internet use (PIU) and at-risk of PIU in 2017. The Surveillance Information System on Risk Behavior is based on annual cross-sectional surveys among the population aged at least 16 years residing in Galicia, Spain. A total of 7,841 participants were recruited in 2017 using a stratified random sampling. Internet users were classified into three categories: normal use, maladaptive/at-risk of PIU and PIU, based on their score in the Internet-related experiences questionnaire. A total of 74.8%, 95% CI [73.8-75.8], of the Galician population aged 16 to 74 used the Internet in the month before the survey was performed, exceeding 95% in the population aged below 45 years. Most users use chat applications and social networks. The prevalence of PIU or at-risk of PIU in the population aged 16 to 74 was 1.0% [0.8-1.3], reaching 5.2% [4.2-6.2] in the population aged between 16 and 24. The prevalence of Internet use in Galicia is slightly lower than those obtained in Spain and Europe. Moreover, PIU is an emerging problem in the population with the youngest population being the most affected.

Keywords: Internet addiction, problematic Internet use, behavioral addictions, mental health, adults

Resumen

El uso de Internet se ha extendido rápidamente por todo el mundo convirtiéndose en una parte indispensable de la vida cotidiana. A pesar de sus ventajas, el uso disfuncional o el abuso de Internet puede conducir a problemas de adicción. Los principales objetivos de este estudio fueron evaluar la prevalencia de uso de Internet, de uso problemático de Internet (UPI) o de riesgo de UPI en la población general gallega en 2017. El Sistema de Información sobre Conductas de Riesgo de Galicia (SICRI) se basa en la realización de encuestas transversales con periodicidad cuasianual entre la población de 16 años y más residente en Galicia, España. En 2017, se incluyeron a 7.841 participantes mediante un muestreo aleatorio estratificado. Los usuarios de Internet se clasificaron en tres categorías: uso normal, inadaptado/en riesgo de UPI y UPI, en función de su puntuación en el cuestionario de experiencias relacionadas con Internet. El 74,8%, 95% IC [73,8-75,8], de la población gallega de 16-74 años utilizó Internet en el último mes, siendo esta prevalencia superior al 95% en la población menor de 45 años. La mayoría de los usuarios utilizan aplicaciones de chat y redes sociales. La prevalencia de UPI o riesgo de UPI en la población de 16 a 74 años fue del 1,0% 95% IC [0,8-1,3], alcanzando el 5,2% 95% IC [4,2-6,2] en la población de 16 a 24 años. La prevalencia de uso de Internet en Galicia es ligeramente inferior a las obtenidas en España y Europa. Además, el UPI es un problema emergente en la población, siendo la población más joven la más afectada.

Palabras clave: adicción a Internet, uso problemático de Internet, adicciones conductuales, salud mental, adultos

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The Internet has recently become an indispensable part of daily life, being a useful tool for information, education, social communication, leisure and entertainment. While in 2009, the prevalence of Internet use among the European population aged 16 to 74 was 63.0%, in 2020 it reached 88.0% (Eurostat, 2020).

According to recent data from the Survey on the Equipment and Use of Information and Communication Technologies in Households, 93.2% of the Spanish population aged 16 to 74 used the Internet in the three months before the survey was performed (Instituto Nacional de Estadística, 2020). The proportion of users is similar among men and women but different according to age group. In total, 99.8% of the population between 16 and 24 were Internet users. Galicia, with a prevalence of use of 87.4% in the population aged between 16 and 74 years, is the Spanish region with the lowest percentage of users (Instituto Nacional de Estadística, 2020).

Behavioral addictions or non-substance addictions, have gained prominence in recent years as the use of new technologies has increased, highlighting the potential influence the Internet might have on these behaviors. Despite its advantages, the dysfunctional use or abuse of the Internet can lead to addiction problems, with the youngest population being the most vulnerable (Bousoño et al., 2017; Echeburúa & de Corral, 2010; Ruiz-Olivares, Lucena, Pino & Herruzo, 2010), especially adolescents (Leung, 2007). It should be noted that very few studies have thoroughly focused on middle-aged and older populations.

Internet addiction is an emerging problem in modern societies because specific diagnostic criteria are lacking and this addiction is not incorporated in diagnostic reference manuals. In addition, the terminology used to name this condition encompass various terms, such as "internet addiction" (Young, 1998), "problematic internet use" (Caplan, 2002), "pathological internet use" (Morahan-Martin & Schumacher, 2000), "excessive internet use" (Hansen, 2002) or "internet dependency" (Rahmani & Lavasani, 2011). Most of the above-mentioned terms are defined as behavioral addictions that should follow the diagnostic criteria models used in the diagnostic reference manuals for gambling (Caplan, 2002; Hansen, 2002; Young, 1998). However, other terms, such as pathological internet use, imply the presence of symptoms such as mood disturbance (Morahan-Martin & Schumacher, 2000). The term problematic internet use (PIU) will be used in the present study. PIU is described as an inability to self-control the use of the Internet resulting in excessive use which leads to clinical impairment or distress with negative consequences in daily life (Young & Nabuco, 2011). Some authors indicate that people with PIU have lower physical, psychological and social well-being, and it interferes with their daily activities and in their relationships with family and friends (Kalmus, Siibak & Blinka, 2014). However, more articles are needed to characterize PIU as it is an emerging problem.

The prevalence of PIU is difficult to determine because of the lack of agreement on diagnostic criteria, terminology and measurement instruments. In Europe, prevalence of PIU among adolescents varies from 1.2% (Tsitsika et al., 2014) - 1.4% (Blinka et al., 2015) to 4.4% (Durkee et al., 2012). In Spain, the prevalence reported for adolescents ranged from 5.0% to 6.0% (Carbonell et al., 2012; Fernández-Villa et al., 2015; López-Fernández, Freixa-Blanxart & Honrubia-Serrano, 2013). To the best of our knowledge, to date there are no studies of prevalence of PIU in the adult Spanish population, except for those performed on adolescents. Furthermore, there are no studies that have analyzed characteristics associated with non-Internet users. Given that Galicia is the region with the lowest prevalence of Internet users, we believe it is important to know whether aspects such as being one of the regions with the oldest population or with a high number of people living in rural areas are related to not being Internet users.

Several objectives were established in this study: a) to assess the prevalence of Internet use in the general Galician population; b) to describe the Internet user profiles; c) to assess the prevalence of PIU and at-risk of PIU; d) to characterize the population with PIU and at-risk of PIU; e) to characterize non-Internet users.

Methods

Study area and population

A cross-sectional study was performed in Galicia, Spain, an autonomous northwestern region with an estimated population of 2.7 million in 2017. The boundaries of Galicia to the north and west are marked by the Atlantic Ocean, to the south by Portugal, and to the east by mainland Spain.

Data source

The survey, carried out in 2017 within the framework of the Risk Behavior Information System, targeted Galician residents who were at least 16 years of age. The sample was derived from the Galician GP patient database (Tarjeta Sanitaria), which accounts for 97.0% of the Galician population, using random sampling stratified by age group (16 to 24, 25 to 44, 45 to 64 and 65 and older). The sample size (7,841 in total) was calculated independently for each age stratum, considering an expected prevalence of 50% and an error of 3.5%.

The information was collected through a computer-assisted telephone interview (CATI) system and the questionnaire included questions regarding the use of the Internet. Internet use was defined by the affirmative answer to the following question: "In the last 4 weeks, have you connected to the Internet to use instant messaging, use social net-

works, check your mail, download music…?" Interviewers warned the respondent not to consider the time spent using the Internet at work and to take into account the connection both from computers and from mobile devices or tablets.

Internet addiction was assessed using the validated Internet-related experiences questionnaire (CERI) (Beranuy, Chamarro, Graner & Carbonell, 2009). Its internal consistency was described as around 0.77 and factor analysis showed a robust dimension composed by two constructs: intrapersonal and interpersonal conflicts. The CERI questionnaire consists of 10 items about Internet use habits, with 5 answer choices scored from 0 to 4 (0-never, 1-rarely, 2-occasionally, 3-very frequently, 4-always). The total score of the scale, which can range from 0 to 40 points, was used to classify Internet users into three groups: normal use (<18 points), maladaptive or at risk of PIU (18-25) and PIU (26 or above).

To characterize the population with PIU or at risk of PIU and non-internet users, logistic regression models were fitted. The following factors were introduced in the regression models in order to evaluate their possible association with PIU or with the non-use of the Internet: gender, age group, country of birth, residential environment (urban, semi-urban, rural) according to the Galician Statistical Institute (Instituto Galego de Estatística, 2016), employment status (workers, students, pensioners, others), educational level (basic, medium, high), marital status and self-perception of health. Furthermore, to characterize subjects with PIU or at-risk of PIU, self-perception of weight and connection time to chat applications, social networks and virtual reality games (<2 hours per day, ≥2 hours) were also ascertained. In the final model, variables with $p < .05$ were included.

Statistical analysis

The percentage, by gender and age categories, of individuals who have used the Internet for the last month, overall and for each type of application; the percentage of Internet users who spent 2 hours or more per day connected to each application and the percentage of individuals with PIU or at-risk of PIU were calculated.

Adjusted odds ratios (OR) of PIU and non-Internet users were estimated using a logistic regression model. Prevalence and adjusted ORs are presented with 95% confidence intervals (95% CI). The analysis was performed with the weighted sample using Stata v14.2. To compare data from the current survey with those previously published in Spain and Europe, the analysis was restricted to the 16 to 74 age group. The characterization of users with PIU or at risk of PIU was restricted to the population aged 16 to 24 years and that of non-Internet users to the population aged 45 to 74 years, since Internet use is practically universal in the youngest population.

Ethical approval

Ethical approval by the Galician ethics committee was not necessary because this study was voluntary and anonymous, ensuring full confidentiality. The study was conducted by telephone, and accordingly agreement to participate implies verbal informed consent.

Results

This study analyzed information provided from 7,841 adults aged 16 or over, with a response rate of 78.0%. Among these participants, 6,875 were between 16 and 74 years (1,829 of 16-24 and 3,039 of 45-74). The characteristics of the included population aged 16-74 years old are summarized in Table 1.

A total of 74.8%, 95% CI [73.8-75.8] of the Galician population aged 16 to 74 reported using the Internet in the month before the survey was performed. No differences were found in terms of gender, except for the group aged 45-54 in which the prevalence of use was eight percentage points higher in women in comparison to men (80 vs. 88%). Prevalence varied considerably according to the age group (Figure 1), above 95% in the population aged below 45 but not reaching 60% in the population between the ages of 45 to 74 years. Although the analysis was restricted only to the population aged 16 to 74, it should be noted that 65.3% 95% CI [64.4-66.2] of the Galician population aged 16 or older used the Internet in the month before the survey; the prevalence of use among the population aged 75 or over was only 6.8% 95% CI [5.3-8.4].

Most Internet users reported using chat applications and social networks, followed by virtual reality games as a distant third. Younger individuals (16-24 years) are those who most use all options with prevalences of 96.3% 95% CI [95.4-97.1] for chat applications, 82.5% 95% CI [80.7-84.2] for social networks and 17.8% 95% CI [16.1-19.5] for virtual reality games. It was found that females and males differ in their activities when they are connected to

Figure 1
Percentage of population aged 16-74 who has used Internet for the last 4 weeks

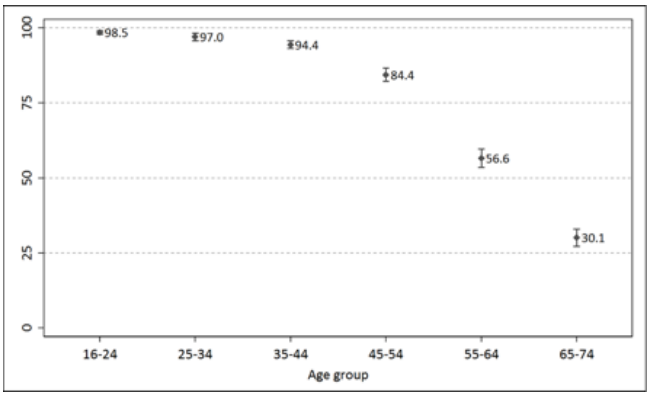
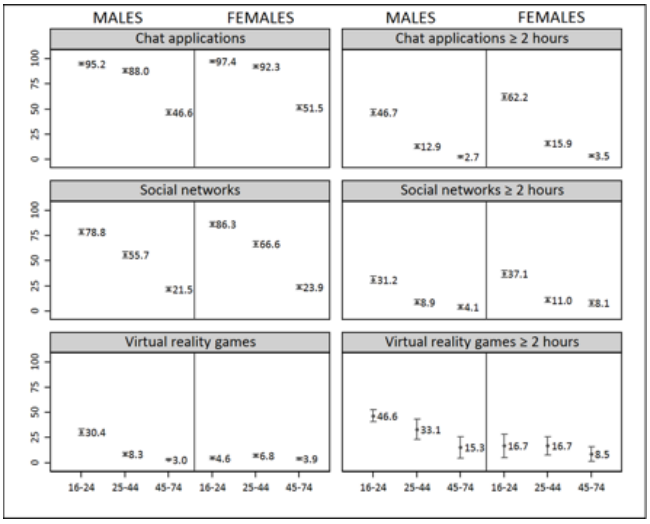


Table 1
Sociodemographic characteristics of the Galician population aged 16-74 years old

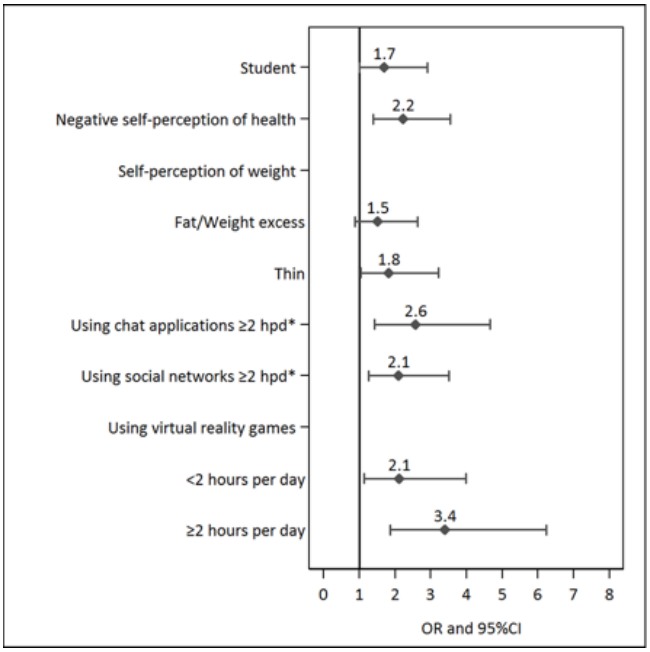
	n	%	95% CI	
Gender				
Male	3460	49.0	49.0	49.0
Female	3415	51.0	51.0	51.0
Age group				
16-24	1829	9.1	9.0	9.2
25-44	2007	34.9	34.6	35.2
45-64	2003	38.8	38.5	39.2
65-74	1036	17.2	17.0	17.4
Country of birth				
Spain	6297	91.7	91.0	92.4
Other country	578	8.3	7.6	9.0
Marital status				
Lives with a partner	3725	65.5	64.3	66.6
Does not live with a partner	3150	34.5	33.4	35.7
Educational level				
Basic	3014	44.9	43.7	46.0
Medium	2487	32.7	31.5	33.9
High	1374	22.5	21.4	23.5
Residential environment				
Urban	4214	61.4	60.1	62.6
Semi-urban	1745	25.2	24.1	26.3
Rural	905	13.4	12.6	14.3
Employment status				
Worker	3170	52.6	51.5	53.7
Student	1342	7.4	7.1	7.7
Pensioner	1276	21.7	21.0	22.5
Other	1087	18.3	17.3	19.2
Self-perception of health				
Very good	1076	13.1	12.3	13.9
Good	2859	39.7	38.5	41.0
Fair	2327	36.3	35.1	37.6
Bad-Very Bad	613	10.8	10.0	11.7
Self-perception of weight				
Fat/Weight excess	2641	43.2	42.0	44.5
Suitable weight	3513	47.6	46.4	48.9
Thin	721	9.2	8.4	9.9
WhatsApp hours of use				
Does not use	1848	32.3	31.2	33.3
Uses <2h	3741	57.6	56.4	58.7
Uses ≥2h	1286	10.2	9.6	10.8
Social networks hours of use				
Does not use	3455	58.4	57.3	59.5
Uses <2h	2730	36.1	34.9	37.2
Uses ≥2h	690	5.5	5.0	6.0
Virtual reality games hours of use				
Does not use	6296	93.8	93.2	94.4
Uses <2h	387	4.6	4.1	5.1
Uses ≥2h	192	1.6	1.3	1.9

Figure 2
Population who has used each Internet option, and Internet users who spent ≥2 hours/day connected



Note. Data are shown in percentage.

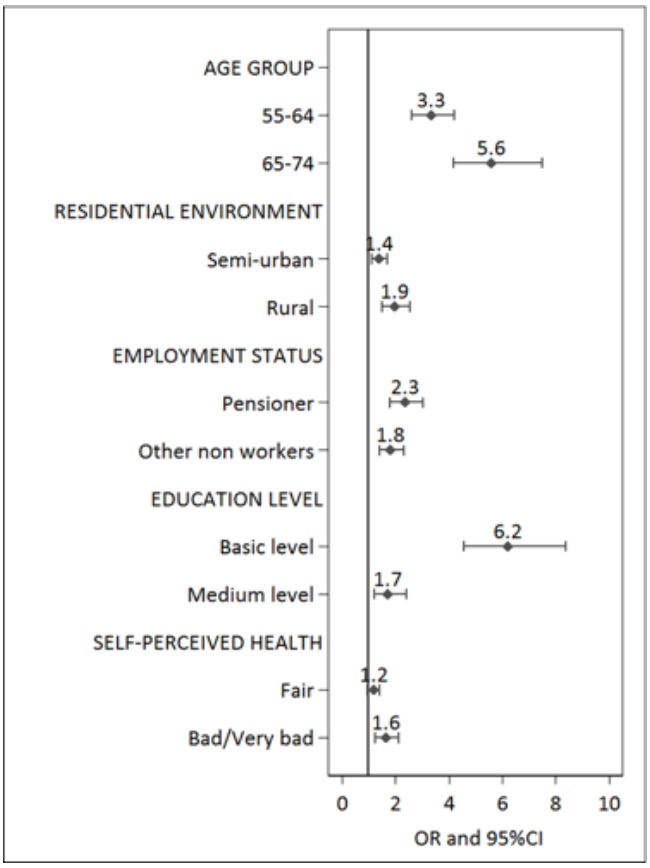
Figure 3
Characteristics associated with problematic or at-risk internet use (PIU) among Internet users aged 16-24



Note. *hpd: hours per day. Odds ratio (OR) and 95% confidence intervals (95% CI).

the Internet, thereby, prevalence of use was slightly higher in females than in males with regard to instant messaging applications and, chiefly, social networks. Males achieved the highest prevalence of virtual reality games use. These differences regarding gender are more evident in the use of virtual reality games among people aged 16 to 24 95% CI (30.4% [27.4-33.4] among males vs. 4.6% 95% CI [3.2-5.9] among females) (Figure 2).

Figure 4
Characteristics associated with not being an Internet user



Note. Odds ratio (OR) and 95% confidence intervals (95% CI).

The prevalence of PIU or at-risk of PIU in the population aged 16 to 74 was 1.0% 95% CI [0.8-1.3], being only 0.1% 95% CI [0.0-0.1] with PIU. If only the population aged between 16 and 24 is considered, this percentage reaches 5.2% 95% CI [4.2-6.2], most of them at-risk of PIU (4.7 95% CI [3.7-5.7] at-risk of PIU vs. 0.5% 95% CI [0.2-0.8] PIU).

Results of the multivariable logistic regression analysis are shown in Figure 3. Among Internet users aged 16 to 24, being a student, having a negative self-perception of health, not perceiving an adequate weight or spending 2 or more hours per day using chat applications, social networks or virtual reality games increases the probability of PIU or at-risk of PIU. This probability is approximately two-fold in individuals who use the Internet more than two hours per day, regardless of the type of use.

For the non-Internet user group, being older, living in a different area from urban (rural or semi-urban), being a pensioner, having a low level of education and having a negative self-perception of health, were more related with not using the Internet (Figure 4).

Discussion

In accordance with our data, prevalence of Internet use in the Galician population aged 16 to 74 is estimated at 74.8% in 2017. This result is similar to that obtained from the survey of the Spanish National Institute of Statistics for Galician population in the same year (79.4%) but the prevalence is lower that obtained for the Spanish population (84.6%) (Instituto Nacional de Estadística, 2017a) and for the European population (84.0%) (Eurostat, 2019). It is important to emphasize that the reference period used to measure Internet use in this study differs to those other two studies. While in the survey of the Spanish National Institute of Statistics (Instituto Nacional de Estadística, 2017a) and Eurostat statistics (Eurostat, 2019) respondents were asked about Internet use in the last three months before the survey, in the current study it was set at one month.

The highest prevalence of Internet use in the Galician region is observed among population below 45 years, reaching 95.0%, with a maximum of 98.5% among the youngest (16-24 years). As age increases, Internet use decreases in both males and females, with the lowest percentage corresponding to the 65-74 age group (30.1%). This figure is clearly lower than those obtained for the Spanish and European populations in which 43.7% and 54.0% of individuals between 65 and 74 years used the Internet in the last three months, respectively (Eurostat, 2019; Instituto Nacional de Estadística, 2017a). Therefore, there is a greater number of non-Internet users in Galicia in comparison with Spain and Europe, especially in advanced age groups.

This study shows that chat applications, followed by social networking, were the most used tools among Internet users, especially by the youngest population. This is in line with a previous Spanish study conducted in 2016 on a population aged 14 to 18 (Ministerio de Sanidad, Consumo y Bienestar Social, 2016) which estimated that 99.6% of young people used WhatsApp, 97.9% social networks and 6.0%, mainly male, made online bets in the last month. Previous studies have also shown differences between males and females in relation to the activities chosen when they are connected (Andreassen, Torsheim, Brunborg & Pallesen, 2012; Carbonell, Fúster, Chamarro & Oberst, 2012; Fernández-Villa et al., 2015; Ha & Hwang, 2014; Kuss & Griffiths, 2011; Liang, Zhou, Yuan, Shao & Bian, 2016). Our results support the hypothesis that females are more likely to use social networks and chat applications whereas males spend more time than women playing virtual reality games.

According to the data obtained in the current study, prevalence of PIU among Galician population aged 16 to 74 is estimated at 0.1%, reaching 0.5% if only the population between 16 and 24 is considered. In this group it should be noted that almost 5% of them are at-risk of PIU. Although several investigations have studied this phenomenon there are no reliable data on the overall prevalence, mainly because of the lack of agreement on the terminology used, diagnostic criteria and diagnostic instruments (Kuss & Griffiths, 2011). It is noteworthy that most of these studies have focused on adolescents or young people since they are most likely to develop PIU. The EU Kids Online survey identified that 1% of children aged 11–16 might show pathological levels of Internet use (Smahel et al., 2012). Very similar figures were obtained by Tsitsika et al. (2014) and by Blinka et al. (2015) who estimated a PIU prevalence among European adolescents of 1.2% and 1.4%, respectively. However, the study conducted within the framework of the European funded project *Saving and Empowering Young Lives in Europe* (SEYLE) in a representative sample of adolescents, found a slightly higher PIU prevalences estimating that 4.4% and 13.5% are maladaptive users (Durkee et al., 2012).

In Spain, prevalence of PIU in adolescents and young populations varies widely across studies. A study conducted on adolescents from Madrid has reported a prevalence of PIU of 3.7% (Estévez, Bayón, de la Cruz & Fernández, 2009). Other studies also conducted on Spanish adolescents estimate prevalences varying from 5 to 6% (Carbonell et al., 2012; Fernández-Villa et al., 2015; López-Fernández et al., 2013). The highest prevalence was found in the study carried out by Muñoz-Rivas, Fernández & Gámez-Guadix (2010) with 9.9% of excessive users among university students. Two studies carried out in Galicia should be mentioned, since they estimated prevalences of PIU among Galician adolescents of 19.9% and 16.3% (Gómez, Rial, Braña, Varela & Barreiro, 2014; Gómez, Rial, Braña, Golpe & Varela, 2017). Although other studies found a greater risk of PIU than the current study, their samples were mostly composed of teenagers, in comparison with the current study conducted on subjects aged 16 and over. Therefore, age might explain the differences between our findings and those of previous studies.

In this study, no statistically significant differences regarding gender were found in the prevalence of PIU. This information contradicts results reported in another Galician study in which being an adolescent female was associated with a higher risk of PIU (Gómez et al., 2017). In contrast, scientific literature exists in which males are most at risk (Kormas, Critselis, Janikian, Kafetzis & Tsitsika, 2011; Sánchez-Carbonell, Beranuy, Castellana, Chamarro & Oberst, 2008; Tsai et al., 2009).

In a study conducted in university students from several Spanish universities, in which 2,780 participants with an average age of 20.8 years (±5.1 years) participated, an association was found between PIU and having a poor self-perception of health, being a thin or overweight/obese person and using applications such as chats, social networks and games (Fernández-Villa et al., 2015). These results are consistent with those found in our study in the 16-24 age group. In another study, carried out at the University of Zaragoza,

involving 698 students (mean age: 21.96 ± 5.43), an association was found between PIU and the number of hours of daily internet exposure (Ramón-Arbués et al., 2021). In our study, this association was also observed, increasing the probability of PIU when the time spent on the Internet was more than 2 hours per day.

To our knowledge, this is the first study to characterize non-Internet users. Factors such as older age or living in rural areas have been found to be related to not being an Internet user in the current study. These factors may explain why Galicia is the region with the lowest prevalence of Internet users in Spain, since according to data from the Galician Institute of Statistics and the Ministry of Agriculture, Fisheries and Food, 19.1% of the population is over 64 years old (11,6% between 65-74 years old) (Instituto Galego de Estatística, 2017a) and 26% of Galicians live in rural areas (Ministerio de Agricultura, Pesca y Alimentación, 2017), where the internet sometimes does not reach. In fact, the percentage of Galician homes with Internet access is almost 5 percentage points below the Spanish average (78.8% vs. 83.4%) (Instituto Galego de Estatística, 2017b).

There are studies that show that within Spain there are digital divides between the different regions when it comes to accessing the Internet (Carmona-Martínez & García-Jiménez, 2007; Lera-López, Gil-Izquierdo & Billón-Currás, 2009). Some authors indicate that these differences between regions may be associated both with sociodemographic variables such as educational level, age, labor occupation or degree of rurality, and with regional variables such as GDP per capita, percentage of employment in the services sector or net ICT capital (Lera-López et al., 2009). In relation to sociodemographic variables, Galicia, in 2017, was the region with the highest aging rate behind Asturias (Instituto Nacional de Estadística, 2017b) and one of the regions with the highest percentage of population residing in rural areas (26%) (Ministerio de Agricultura, Pesca y Alimentación, 2017), and of pensioners (8.1%) (Agencia Tributaria, 2017). These variables decrease the probability of using the Internet and also coincide with some of the characteristics that increase the probability of not being an Internet user found in this study. In relation to the regional variables, Galicia, with 27.5%, was one of the regions with the lowest percentage of the average population employed in the service sector, ranking 13th among the others (Instituto Nacional de Estadística, 2017c). In addition, the figure for Galicia in relation to GDP per capita places it as the tenth region with the highest GDP per capita, a figure that is 10 percentage points below the national figure (Galicia: €24,497 vs. Spain: €24,999) (Instituto Nacional de Estadística, 2018). On the other hand, Galicia is one of the regions with the highest net ICT capital, 4.6% of the national total, although it is quite far from Madrid and Catalonia, which are the regions with the highest net ICT capital, 27.9% and 20.2% of the national total, respectively (Mas-Ivars, Pérez-García, Benages-Candau, Robledo-Domínguez & Vicente-Carrión, 2021). The fact that Galicia is among the regions with the lowest percentage of employment in the service sector and with the lowest GDP per capita, together with the characteristics of the Galician population mentioned above, may explain why Galicia is the region with the lowest percentage of Internet users.

The lack of diagnostic criteria is a clear limitation to measuring PIU. There are different tests and scales to estimate the prevalence of PIU. The main limitation is that these PIU estimates vary considerably depending on the measurement instrument used. Thus, in Spain several scales have been used such as Problems Related to Internet use (PRI) (Gracia-Blanco, Vigo-Anglada, Fernández-Pérez & Marcó-Arbonés, 2002), Internet Addiction Test (IAT) (Echeburúa, 1999), CERI questionnaire (Beranuy et al., 2009) or Problematic Internet Use Scale in adolescents (PIUS-a) (Rial, Gómez, Isorna, Araujo & Varela, 2015). The most crucial objective for future research is to achieve consensus on the conceptualization of the phenomenon itself, on the identification of its diagnostic criteria, and on the use of a common measurement scale or test, in order to facilitate the comparison of data from different studies.

Among the main limitations of this study, it is important to highlight that prevalences may be underestimated because they are based on self-declaration of behaviors. In addition, we jointly analyzed individuals with PIU and at-risk of PIU in the same category, due to the low sample size of individuals with PIU, which complicates analyzing both categories separately.

The large sample size and the inclusion of individuals from 16 years and old is the major strength of this study, and because it guarantees representativeness of the population. The sample was selected from a base which accounts for 97.0% of the Galician population, the 3% not included represents individuals who have not had contact with the public health system. The impact of not having included them is negligible. To our knowledge, this is the first study to assess the prevalence of PIU in the adult Spanish population.

Our findings indicate that the prevalence of Internet use in Galicia is slightly lower than those obtained in Spain and Europe. Addictions not linked to substance use constitute a Public Health problem and both educational and regulatory measures should be directed especially to younger population and vulnerable groups. Older individuals and those with basic studies are most unlikely to be Internet users. Moreover, PIU is an emerging problem in the population, being the youngest population the most affected.

Conflict of interests

All authors declare that they have no conflicts of interest.

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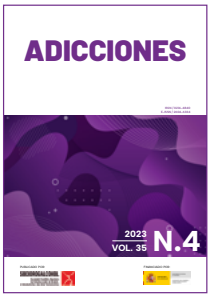

ORIGINAL

Review of the questionnaires used to detect alcohol consumption during pregnancy and the Green Page

Revisión de los cuestionarios utilizados para la detección del consumo de alcohol durante el embarazo y la Hoja Verde

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Abstract

Alcohol consumption during pregnancy is a leading cause of fetal alcohol spectrum disorder (FASD). Maternal reporting in childbearing women or pregnant women is the standard for the early detection of alcohol consumption. The Green Page (GP) is a screening questionnaire of environmental health which includes the alcohol intake record during pregnancy and/or lactation period. The aim of this paper is to review the features of the different questionnaires for the detection of alcohol consumption during the gestation period and the GP, as well as to make a comparison between them. Review of the scientific literature published over the last 10 years of indexed articles in Medline. Combined searching strategy with MeSH descriptors: 'pregnancy, alcohol drinking, surveys and/or questionnaires. AUDIT, AUDIT-C and SURP-P are mainly self-administered and do not require training. SURP-P and 4P´s are validated in pregnant women. Others detect quantity and frequency of exposure, need specific training and are administered face to face: TLFB, RD, ACOG antepartum record and the GP. ACOG antepartum record and GP are specific for pregnant population. GP detects alcohol consumption at the beginning of pregnancy in both women and their partner on a holistic and global environmental health approach. A careful face-to-face recording of alcohol exposure with trained staff, with an integrative and global environmental health focus throughout pregnancy, may help improve prevention and screening of pregnancy at risk for FASD.

Key words: pregnancy, surveys and questionnaires, alcohol drinking, Green Page, fetal alcohol spectrum disorder

Resumen

El consumo de alcohol en el embarazo es la causa del trastorno del espectro alcohólico fetal (TEAF). La información aportada por las mujeres en edad fértil o embarazadas es el estándar para la detección temprana del consumo de alcohol. La Hoja Verde (HV) es una herramienta de cribado de salud medioambiental que incluye el registro de la ingesta de alcohol durante el embarazo y/o lactancia. El objetivo del presente trabajo es revisar las características de los distintos cuestionarios de detección del consumo de alcohol durante la gestación y de la HV, así como hacer una comparación entre ellos. Revisión de la literatura científica publicada en los últimos 10 años de los artículos indexados en Medline. Estrategia de búsqueda combinada con los descriptores MeSH: 'pregnancy, alcohol drinking, surveys and/or questionnaires'. AUDIT, AUDIT-C y SUPR-P se realizan mayoritariamente autoadministrados y no requieren entrenamiento. SUPR-P y 4P´s Plus están validados en embarazadas. Otros detectan cantidad y frecuencia, requieren entrenamiento previo y se realizan cara a cara: TLFB, RD, ACOG antepartum record y la HV. ACOG antepartum record y la HV son específicos para embarazadas. La HV detecta el consumo de alcohol al inicio del embarazo tanto en la gestante como en su pareja con un enfoque holístico y global de la salud medioambiental. Un cuidadoso registro de la ingesta de alcohol de forma presencial, con profesionales entrenados y con un enfoque holístico y global de la salud medioambiental durante el embarazo ayudaría a mejorar la prevención y cribado de embarazos en riesgo de TEAF.

Palabras clave: embarazo, encuestas y cuestionarios, consumo de alcohol, Hoja Verde, trastorno del espectro alcohólico fetal

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Despite alcohol being a socially accepted and readily accessible drug (Howlett et al., 2018) in Western societies, it has not been possible to establish a safe level of alcohol intake during pregnancy (Schambra, Lewis & Harrison, 2017; Schuchat, 2017). Abstinence is therefore recommended in pregnant women and women of childbearing age (Carson et al., 2010; Chang et al., 2005). The prevalence of alcohol use in Spain in women of childbearing age (15-44 years) in the last 12 months and 30 days is 70% and 54%, respectively (Observatorio Español de las Drogas y las Adicciones [OEDA], 2019), while consumption of around 40-70% has been found at the beginning of pregnancy (Blasco-Alonso et al., 2015; Ortega-García et al., 2012).

Alcohol during pregnancy is teratogenic and a powerful neurotoxin for the fetus, and can cause a wide range of physical and neurodevelopmental defects, all of which are included under the rubric of fetal alcohol spectrum disorders (FASD) (Hoyme et al., 2016). The prevalence of FASD in Western countries is estimated to be between 3-5% of the school population (Centers for Disease Control and Prevention [CDC], 2019; May et al., 2018). Scientific societies have highlighted the importance of identifying at-risk pregnancies in diagnosing FASD and emphasize screening for intrauterine alcohol exposure (Cook et al., 2016). Consensus clinical guidelines on alcohol and pregnancy further recommend that screening for alcohol use be carried out in women of childbearing age (Carson et al., 2010, 2017).

In clinical practice, detection of alcohol use in pregnancy is done by direct questioning regarding the quantity and/or frequency of drinking or through standardized questionnaires. The World Health Organization (WHO) supports this by promoting the development of environmental screening to detect and manage environmental risks in pregnancy and childhood (WHO, 2018). The Pediatric Environmental Health Specialty Unit (PEHSU-Murcia) has adapted the WHO Green Page (GP) for pregnancy and lactation. This environmental, global and holistic screening tool for the pregnant couple includes, among other factors, the quantity and frequency of alcohol intake during pregnancy and lactation (Ortega García, Sánchez-Sauco, Jaimes-Vega & Pernas-Barahona, 2013a, 2013b).

This study aims to review the characteristics of the different questionnaires for detecting alcohol use during pregnancy and the GP, as well as to compare them.

Method

We reviewed the scientific literature published in the last ten years (up to December 2020) of articles published in Spanish or English indexed in Medline. The combination of the following descriptors was used as a search strategy: <<pregnancy>> [MeSH Terms] AND <<alcohol drinking>> [MeSH Terms] AND <<surveys and questionnaires>> [MeSH Terms]. Study types were limited to clinical trials, meta-analyses, observational studies, randomized controlled trials, clinical studies, case reports, government publications, clinical practice guidelines, reviews, systematic reviews, and validation studies. The search strategy was expanded with a manual review of the bibliographies of articles included in order to detail the methodology of the screening tools that were not sufficiently explained in the paper.

Results

A total of 441 references were identified (426 by Pubmed search and 15 by manual search), of which 387 were excluded, leaving a selection of 54 articles for evaluation. Figure 1 shows the article selection algorithm.

In the selected studies, alcohol use is assessed in three ways: based on a scoring scale and cut-off point, and through

Figure 1
Algorithm for item selection

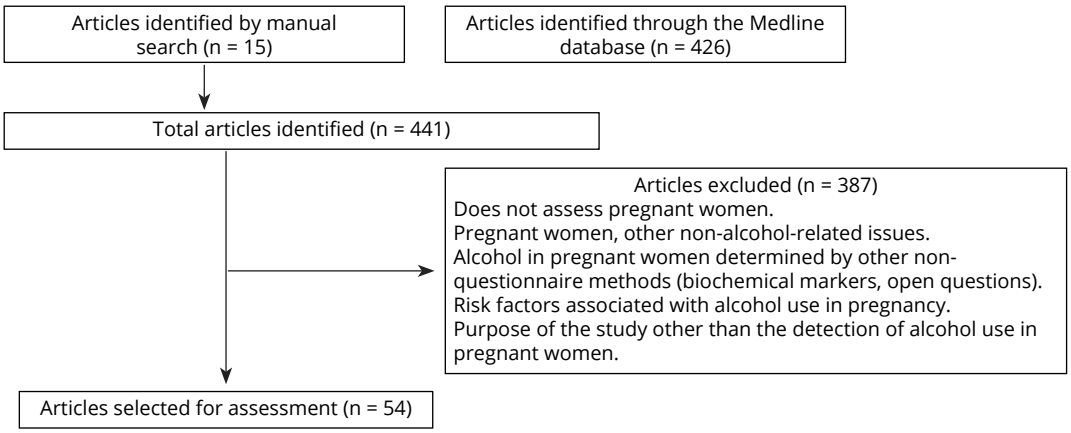

Table 1
Questionnaires/screening tools for alcohol use in pregnant women

Name	Records quantity and frequency	Alcohol use detection method	Number of questions	Pregnancy specific	Validated for pregnanct	Other drugs considered	Partner considered	FtF / SelfA	Requires training	Time needed (min)	Includes other risk factors
AUDIT	Yes	Score	10	No	No	No	No	SefA	No	2	No
AUDIT-C	Yes	Score	3	No	No	No	No	FtF/ SefA	No	1	No
CAGE	No	Score	4	No	No	No	No	SefA	No	1	No
NET	No	Score	3	Yes	No	No	No	SefA	No	1	No
T-ACE	No	Score	4	Yes	Yes	No	No	SefA	No	1	No
T-WEAK	No	Score	5	Yes	Yes	No	No	SefA	No	1	No
SMAST	No	Score	13	No	No	No	No	SefA	No	2-3	No
ASSIST 3.0	Yes (only frequency)	Score	8	No	No	Tobacco and illegal drugs	No	FtF	No	5-10	No
SURP-P	Yes	Qualitative	3	Yes	Yes	Marijuana	No	SefA	No	1	No
4P´s Plus	Yes	Qualitative	5	Yes	Yes	Tobacco	Yes	FtF	Yes	1	No
TLFB	Yes	Quantitative (SDU/gr)	-	No	No	No	No	FtF	Yes	10-15	No
RD	Yes	Quantitative (SDU/gr)	-	No	No	No	No	FtF	Yes	5	No
ACOG antepartum record	Yes	Quantitative (SDU/gr)	-	Yes	No	Tobacco and illegal drugs	No	FtF	Yes	10-15	Yes
GP	Yes	Quantitative (SDU/gr)	-	Yes	No	Tobacco and illegal drugs	Yes	FtF	Yes	5-7	Yes

Note. AUDIT (Alcohol Use Disorders Identification Test), AUDIT-C (Alcohol Use Disorders Identification Test-Consumption), CAGE (Cut Down, Annoyed, Guilty, Eye Opener), NET (Normal ,Eye opener, tolerance), T-ACE (Tolerance, Annoyance, Cut Down, Eye Opener) , TWEAK (Tolerance, Worried, Eye Opener, Amnesia, Cut Down), SMAST (Short Michigan Alcoholism Screening Test), ASSIST (Alcohol Smoking, and Substance Involvement Screening Test), SURP (Substance Use Risk Profile-Pregnancy), TLFB (time line follow back), RD (Retrospective Diary), American College of Obstetricians and Gynecologists (ACOG) antepartum record; GP (Green Page of pregnancy and lactation); FtF/SelfA: face to face/self-administered; SDU/gr: Standard Drink Unit/grams of alcohol.

qualitative or quantitative assessment (Standard Drink Units (SDU)/grams of alcohol consumed) (Table 1).

Questionnaires/instruments for assessing alcohol use based on scoring scale and cut-off point

These instruments measure alcohol use by means of points scored on a completed questionnaire. A set cut-off point signals a certain drinking pattern which, although some consider quantity and frequency, does not correlate with the grams of alcohol drunk, where higher scores indicate a greater likelihood of risky or harmful drinking and/or alcohol dependence (WHO, 2001).

Table 2 shows the questionnaires/instruments assessing alcohol use based on a scoring scale and cut-off point.

The detection of alcohol use in pregnant women using the Alcohol Use Disorders Identification Test (AUDIT) uses the cut-off point (score ≥6) established to assess dangerous or harmful alcohol consumption in adult women (Comasco, Hallberg, Helander, Oreland & Sundelin-Wahlsten, 2012). AUDIT-C (short version of AUDIT) detects risky consumption using a score of ≥3. When AUDIT-C is used in the pregnant population, changes are made in questionnaire structure and different cut-off points are applied to those validated in the general population (Comasco et al., 2012; Howlett et al., 2018; Mpelo et al., 2018).

T-ACE (Tolerance, Annoyance, Cut Down, Eye Opener) is the tool recommended by both the American College of Obstetricians and Gynecologists (ACOG) and the National Institute on Alcohol Abuse and Alcoholism (NIAAA) for

Table 2
Alcohol use screening questionnaires/tools based on a scoring scale and cut-off point

Name	Type of alcohol use assessed	Cut-off
CAGE	Alcohol dependence	≥2*
SMAST	Alcohol dependence	≥2*
AUDIT	Risky, harmful and dependent drinking	≥6*
AUDIT-C	Risky drinking	≥3*
NET	Risky drinking	Scoring range 0-4. No cut-off.
T-ACE	Risky drinking	≥2
TWEAK	Risky drinking	≥2
ASSIST 3.0	Risky drinking	≥5

Note. CAGE (Cut Down, Annoyed, Guilty, Eye Opener), SMAST (Short Michigan Alcoholism Screening Test), AUDIT (Alcohol Use Disorders Identification Test), AUDIT-C (Alcohol Use Disorders Identification Test-Consumption), T-ACE (Tolerance, Annoyance, Cut Down, Eye Opener), TWEAK (Tolerance, Worried, Eye Opener, Amnesia, Kut down) and ASSIST 3.0 (Alcohol Smoking, and Substance Involvement Screening Test).
Note. *Cut-off points considered traditional (different cut-off points that may be obtained in each questionnaire result in different sensitivity and specificity). Higher scores on a questionnaire indicate a greater likelihood of risky, harmful, or dependent drinking.

detecting risky periconceptional drinking (Chiodo, Sokol, Delaney-Black, Janisse & Hannigan, 2010).

T-ACE and TWEAK (Tolerance, Worried, Eye Opener, Amnesia, Cut Down) are questionnaires designed and validated in pregnant women to assess risky drinking, defined as consumption equal to or greater than one ounce of alcohol daily (equivalent to 23.3 grams of alcohol). In both, risky drinking is considered to occur with a questionnaire score above 2 (Esper & Furtado, 2019; Kiely, Thornberry, Bhaskar & Rodan, 2011). A T-ACE cut-off point of 3 results in greater specificity in the identification of children with possible FASD (Chiodo et al., 2010).

The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) V3.0 was designed in the field of Primary Care to detect the use of alcohol and other drugs. The questionnaire score determines the type of intervention to be carried out. In pregnant women, a score of 5 identifies drinkers whose alcohol consumption puts the fetus at risk (Hotham, Ali, White, Sullivan & Robinson, 2013).

CAGE (Cut Down, Annoyed, Guilty, Eye Opener) and Short Michigan Alcoholism Screening Test (SMAST) questionnaires are rarely used in pregnant women since they are focused on detecting alcohol dependence.

Sensitivity and specificity of the different questionnaires varies depending on the definition of risky drinking used in each case, the cut-off point selected and whether it is applied at the periconceptional stage or during pregnancy, as well as on the population studied and the alcoholic drink standard used (Burns, Gray & Smith, 2010; Chiodo et al., 2010; Praestegaard, Kesmodel & Kesmodel, 2018). The most sensitive questionnaires for the detection of risky periconceptional drinking are TWEAK, T-ACE and AUDIT-C (Burns et al., 2010). Compared to T-ACE, TWEAK has better sensitivity but lower specificity.

Most of these questionnaires can be self-administered and do not need much experience.

Questionnaires/instruments for qualitative assessment of alcohol use

4P´s Plus and Substance Use Risk Profile-Pregnancy (SURP-P) include screening for alcohol and other legal and illegal substance and were developed and validated in the pregnant population. 4P's Plus and SURP-P return a positive value if any amount of alcohol or other drugs is reportedly consumed in the month prior to pregnancy confirmation. These tools have higher sensitivities than TWEAK (Chasnoff, Wells, McGourty & Bailey, 2007; Chasnoff et al., 2005; Yonkers et al., 2010), although specificity is lower.

Instruments for the quantitative assessment of alcohol use (Standard Drink Units (SDUs)/ grams)

These are tools that allow the quantity, frequency and type of use (chronic or binge drinking) to be recorded in daily or weekly drink units or grams of alcohol. Professionals require training prior to using them. None has been validated in the pregnant population.

Time Line Follow Back (TLFB) and Retrospective Diary (RD) are tools that only record alcohol intake, and although they were not developed for pregnant women, they have been applied to this population (Dukes et al., 2017; Symon, Rankin, Butcher, Smith & Cochrane, 2017). In the case of TLFB, to obtain more precise information on the daily amount of alcohol consumed, it includes the type and brand of drink (the graduation varies for the same type of alcoholic beverage), frequency and quantity (Dukes et al., 2017).

RD, on the other hand, is a tool measuring weekly alcohol intake (Monday to Sunday), highlighting whether

Table 3
Green Page Pregnancy Spheres (Ortega García et al., 2013a, 2013b)

Sociodemographic variables: • Home • Education level of both parents • Socioeconomic level
Obstetric history and characteristics of current pregnancy.
Exposure to ionizing radiation (periconceptional and different periods of pregnancy).
Exposure to drugs, parapharmaceutical and herbal products.
Occupational exposure and risky hobbies.
Exposure to legal and illegal drugs.
Pesticides at home.
Personal perception of environmental risks.

the pattern of use remains the same in the time evaluated. It consists of a table detailing the different types of alcoholic beverages, specifying the amounts of each one drunk in ml. Cards are used to remember and specify the type of drink (Symon et al., 2017).

The ACOG antepartum record is a tool which, in addition to recording alcohol use, allows the medical and obstetric history to be recorded, as well as data on the current pregnancy (Bracero et al., 2017).

The pregnancy and lactation GP is an adapted version of the WHO recommendations. It is made up of a set of basic and concise questions to allow the environmental risks in the pregnant couple to be explored. The GP approach is based on a comprehensive overview evaluating physical, chemical, biological, social and psychosocial factors that affect the health of the pregnant woman and her child (Table 3). The different environmental risk factors include quantification of alcohol intake in daily grams during the different risk periods (spermatogenesis, periconceptional period, pregnancy and/or lactation). The GP is reproducible and has been adapted to the reality of different countries (de Moura Ribeiro, Texeira de Siqueira, Umbelino de Freitas, Carneiro Gomes Ferreira & Imperi de Souza, 2016). Training is required prior to use, and it is carried out face to face with the pregnant couple within a motivational interview framework in 5-7 minutes (Ortega-García et al., 2013a, 2013b).

ACOG antepartum record and GP have high specifity in the pregnant population.

Table 4 shows the advantages and disadvantages of the different questionnaires/tools for detecting alcohol use in pregnant women compared to the GP.

Discussion

Tackling the issue of legal and illegal drugs in general and alcohol in pregnancy in particular is a taboo subject, given the biological, psychological, social and legal implications. While information provided by pregnant women about their alcohol use is currently the gold standard in the detection of prenatal alcohol exposure, alcohol screening during pregnancy is still scarce, incomplete and/or relegated to self-administered questionnaires.

The factors found to be associated with alcohol use in pregnancy include the partner's alcohol intake, the number of bars in their neighbourhood, smoking, difficulty in accessing health services, as well as socioeconomic and obstetric factors (Cannon et al., 2012; May et al., 2008; Ortega-García, López-Hernández, Azurmendi Funes, Sánchez Sauco & Ramis, 2020). Overall, better results are obtained when alcohol is included in a comprehensive risk screening of pregnant women (Balachova et al., 2012; Symon et al., 2017).

In our environment, most pregnancies are wanted but often unplanned, so in most cases alcohol intake occurs during the first few weeks (early embryogenesis) when pregnancy has not yet been confirmed (Schuchat, 2017). In addition, pregnant women do not usually have an alcohol dependence profile. In fact, the vast majority of intakes of this toxic are related to festive periods (Christmas, Easter, summer) or social patterns. T-ACE, TWEAK and AUDIT (with assessment of alcohol use based on a score and cut-off point) frequently lead to the underreporting of low-to-moderate intake since they focus on detecting risky drinking and/or dependence (Burns et al., 2010). However, other tools such as TLFB, ACOG antepartum record, RD and GP are capable of collecting drinking patterns and levels, as well as establishing intake timing. T-ACE and TWEAK were developed and validated in pregnant women (Esper & Furtadoet al., 2019; Kiely et al., 2011), while TLFB was not developed or validated in this population (Dukes et al., 2017). GP was developed for the pregnant population, although it has not been validated (Ortega García et al., 2013a). That said, however, while questionnaire validation is important, the lack of it does not imply a lower capacity for detecting prenatal alcohol exposure.

Table 4
Advantages and disadvantages of the different questionnaires/tools for detecting alcohol use in pregnancy compared to the Green Page

	Advantages	Disadvantages	GREEN PAGE	
			Advantages	Disadvantages
Questionnaires/ tools for assessing alcohol use based on a scale with a cut-off point	• Universally known • Mostly self-reported with pencil and paper • Do not require trained personnel • Allow mass screening • Short completion time (1-2 min) • T-ACE and TWEAK validated in pregnant women	• Does not quantify/ Underreports alcohol use • Does not detect partner's alcohol use • Does not include other drugs • Does not consider other risk factors	• Comprehensive pregnancy evaluation • Integrated in motivational interview • Allows grams of alcohol consumed per drink/day to be obtained directly • Gender perspective • Possibility of intervention and/or early diagnosis of disorders related to drinking during pregnancy	• Needs longer completion time • Requires trained personnel • Not validated in pregnant population • Not possible to assess only alcohol
Questionnaires/ tools with qualitative assessment of alcohol use	• Allow mass screening • Short completion time (1-2 min) • Validated in pregnancy	• Does not quantify alcohol use		
Questionnaires/ tools with quantitative assessment of alcohol use	• Allows collection of obstetric data (ACOG antepartum record)	• Need longer completion time • Require trained personnel • Not validated in pregnant population		

Another of the great discrepancies is found in data collection methods. There are notable differences between self-administered questionnaires, those carried out by interviewers, by untrained health professionals and by professionals trained in the detection and management of environmental risks, including drugs. Professionals trained in this type of interview can significantly reduce memory bias, identify and quantify alcohol intake in all critical periods of pregnancy (including spermatogenesis), intervene to eliminate such drinking and establish a follow-up to identify possible pathologies in the future individual born with this background. RD (carried out by trained personnel) detects higher alcohol use at the periconceptional stage, during pregnancy and binge drinking compared to AUDIT and AUDIT-C (mainly self-administered) (Symon et al., 2017). On the other hand, questionnaires carried out by trained personnel take more time to complete (Balachova et al., 2012). Completion time for the different questionnaires is variable and ranges from 1-2 minutes for AUDIT, T-ACE and TWEAK (Burns et al., 2010), and 5-7 minutes for GP (Ortega García et al., 2013b).

The inclusion of the partner in the clinical interview is key in the process due to the effects that drinking alcohol can have on spermatogenesis and due to the normal correlation between the consumption of the partner and that of the pregnant woman (Ortega-García et al., 2020). For this reason, joint intervention is much more effective, not only at a biological level, but also at a behavioural and emotional level. There are two tools that assess the partner's alcohol use, 4P'S Plus and the GP. The first assesses problems related to alcohol and/or drug use, and the second quantifies the amount of alcohol drunk during pregnancy in daily grams and spermatogenesis.

Given the objectivity they provide, many of the advances in the early detection of alcohol during pregnancy are related to biomarkers. Different matrices have been studied, such as maternal hair in the first trimester of pregnancy and meconium in the newborn, and have proven to be sensitive and specific tools in screening for prenatal exposure to alcohol (Himes et al., 2015). However, they are not available in daily clinical practice because their analytical methodology is complex, expensive and not easily accessible (García-Algar et al., 2009; Manich et al., 2012). Biochemical markers alone are not sensitive enough in detecting prenatal alcohol exposure (Bakhireva & Savage, 2011). Thus, the combined use of GP with biomarkers such as carbohydrate-deficient transferrin (CDT) in early pregnancy increases the level of detection and improves the diagnosis of children at risk of FASD (Azurmendi-Funes et al., 2019).

Since there is no safe level of alcohol in pregnancy, effective detection and intervention must be complemented with other personalized preventive interventions (e.g., opportunistic interventions in women of childbearing age) or at a collective level with awareness campaigns. The clinical approach embodied in the motivational interview allows risk factors to be identified that improve the detection of alcohol in these critical periods and thus helps to intervene in the pregnant woman and her environment; it is also recommended that an environment of trust be created

to make it easy for pregnant women to communicate their alcohol use (Carson et al., 2017). Questionnaires carried out face to face by trained personnel will favour the creation of such environments. Specifically, when assessing alcohol within a set of risk factors, the GP will allow the health professional to gain the confidence of the pregnant woman when talking about periconceptional alcohol use.

The GP for pregnancy and lactation is a clinical tool which provides a comprehensive picture of the pregnant woman and her partner. It is a very versatile instrument given that it can be used in preconception consultations, during pregnancy and during lactation. These window periods in which the instrument can be used allow the diagnosis of prenatal exposure to alcohol to be fine-tuned and thus the interventions to be adapted to the needs of the woman and her environment (Johnson et al., 2006). The effective detection of alcohol use during pregnancy involves the consideration of a comprehensive approach, a motivational environment in which it can be applied, specific training of the health professionals who are to carry it out, as well as the inclusion of the partner/environment as part of the process (Balachova et al., 2012; Carson et al., 2010; Sánchez-Sauco, Villalona & Ortega-García, 2019). As all the factors mentioned are considered in the GP, this is a useful tool in the detection of prenatal exposure to alcohol.

Conclusions

Given that there is no safe level of alcohol consumption in pregnancy, it is important to screen for children at risk of prenatal alcohol exposure.

Keeping a careful record of alcohol intake in women of childbearing age or pregnant women is a clinical act that contributes to improved primary prevention and screening for pregnancies at risk of FASD.

T-ACE, TWEAK, SURP-P and 4P's Plus are validated tools in pregnancy. However, the most effective in detecting drinking in pregnancy are those that approach the issue from the global perspective of environmental health by integrating the couple/environment and social networks, quantifying the grams of alcohol, and identifying the periods of intake. They should also be carried out in clinical and motivational interventions and with professionals trained in the detection and management of environmental risks, including drugs.

The GP is a global and holistic tool that allows the identification and management of exposures to environmental health risks (with special attention to exposure to legal and illegal drugs). It also promotes health protection factors in critical periods of pregnancy and lactation. Integrating environmental health into clinical practice will help develop new environmental skills and professional profiles for nurses and midwives.

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Conflict of interests

The authors declare no conflicts of interest regarding the development and publication of this paper.

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Será breve y deberá proporcionar sólo la explicación necesaria para que el lector pueda comprender el texto que sigue a continuación. No debe contener tablas ni figuras, a menos que sean imprescindibles para la comprensión del texto. Debe incluir un último párrafo en el que se exponga de forma clara el o los objetivos del trabajo.

Método

Se describirá claramente el método empleado (selección de la muestra, como se recogieron los datos, instrumentos de recogida de datos o de evaluación, procedimiento, etc.). Se deben identificar los instrumentos de evaluación, tratamientos, fármacos utilizados, aparatos, sistema de evaluación, pruebas estadísticas, etc. Debe especificarse el tipo de estudio (descriptivo, epidemiológico, experimental, ensayo clínico, etc.).

Todos los trabajos que se presenten deben indicar el cumplimiento de los principios éticos necesarios para llevar a cabo la investigación y la referencia del comité de ética u oficina de investigación que haya evaluado la adecuación de dichas investigaciones al marco ético y legal correspondiente.

Es importante que estudios experimentales y ensayos clínicos estén registrados y se indique el número de registro en base de ensayos (p. ej., Clinicaltrials.gov). Deben especificarse los análisis estadísticos utilizados. Cuando estos sean muy novedosos deben describirse con detalle, e indicar el paquete estadístico utilizado con la referencia oportuna. Se recomienda encarecidamente indicar, cuando sea posible, el dato de significación exacta obtenido en los resultados (frente a fórmulas como $p < .05$ o $p < .01$) así como incluir, también cuando sea posible, estadísticos de tamaño del efecto.

Resultados

Los resultados deben presentarse en una secuencia lógica en el texto, tablas y figuras, y acorde al procedimiento descrito en el apartado del método. Se deben utilizar sólo aquellas tablas y figuras estrictamente necesarias, que expresen claramente los resultados del estudio. No se deben duplicar los datos en tablas y figuras, ni tampoco repetir en el texto todos los datos de las tablas y figuras, sólo los más importantes. Es conveniente enfatizar y resumir sólo las observaciones más importantes.

Los ensayos clínicos aleatorizados y diseños experimentales deben adecuarse a las guías CONSORT (www.consort-statement.org) y los estudios con diseños no experimentales a guías internacionales (p. ej., STROBE, https://www.strobe-statement.org/) para la mayor claridad de la lectura y revisión del trabajo. Igualmente, se presentarán los estadísticos del tamaño del efecto correspondiente.

Discusión

Se debe comenzar con el objetivo general del estudio. Enfatizará los aspectos nuevos e importantes del estudio y las conclusiones que se derivan del mismo. No se deben repetir en detalle los resultados presentados en la sección anterior, ni en la introducción. Se ha de destacar lo más importante y controvertido y relacionarlo con otros estudios relevantes sobre el tema. No se deben presentar suposiciones si no se ven apoyadas por los datos o la evidencia previa. Cuando sea apropiado pueden incluirse recomendaciones. Se deben indicar las implicaciones de los hallazgos y las posibles limitaciones (estas preferiblemente formarán un párrafo al final del artículo).

Reconocimientos

Este apartado se situará al final del texto del artículo y justo antes del apartado de Referencias. Cuando se considere necesario se citará a las personas, centros o entidades que hayan colaborado o apoyado la realización del trabajo. Pueden incluirse todas aquellas personas que hayan ayudado en la preparación del artículo, pero no con la intensidad requerida para ser considerados autores. Si el trabajo ha sido financiado se indicarán las entidades financiadoras en este apartado..

Conflicto de intereses

Todos los manuscritos (artículos, revisiones, editoriales, cartas) que se publican en la revista estarán acompañados por una declaración sobre los posibles o reales conflictos de interés o una declaración de que los autores no tienen conflictos de intereses que declarar.

Referencias

Seguirán de forma estricta las Normas de publicación de la American Psychological Association, 7ª edición (2020) (www.apastyle.org).

Tablas y figuras

Irán al final del texto, numeradas, y cada una en una página distinta, siguiendo el diseño propio de la APA. Se indicará en el texto del manuscrito en qué lugar deben ir situadas.

4. EL PROCESO DE REVISIÓN DEL MANUSCRITO

Los artículos son enviados a la revista a través de la **www.adicciones.es**. Los autores deben registrarse en la plataforma web de la revista para poder enviar sus manuscritos. A continuación, recibirán unas claves para poder entrar en la web y revisar la situación de su artículo. No obstante, el editor de la revista enviará un mensaje cuando tenga una decisión tomada o quiera aclarar alguna cuestión. Una vez recibido el manuscrito en la Redacción de la Revista Adicciones empezará el proceso de revisión.

El Editor, normalmente consultando con los Editores Asociados, puede desestimar de entrada un artículo que entienda que claramente no reúne la calidad suficiente o no entra dentro de las prioridades de la revista. El editor puede rechazar de entrada aquellos artículos que no cumplan estrictamente la normativa de la revista (APA), sin pasarlo a revisión por expertos.

Durante el proceso de envío se le solicitará a los autores que aporten el nombre de al menos dos posibles revisores para su artículo (nombre, institución, correo electrónico y ORCID. Los revisores propuestos deberán ser expertos en el tema y no estar ligados a la investigación que se desarrolla en el trabajo presentado. Tampoco podrán pertenecer al actual Comité Editorial de Adicciones. La revista se reserva la decisión de utilizar o no dichos revisores propuestos.

Los manuscritos serán enviados por el Editor o los Editores Asociados a dos o más expertos en el tema (revisores), que harán los comentarios pertinentes sobre el mismo y que requerirán aquellos cambios que estimen necesarios. También pueden dar su opinión sobre la aceptación o rechazo del artículo. La última decisión, basada en el informe de los revisores, o del editor asociado que se hubiese responsabilizado de la revisión, será tomada por el Editor de la revista, que podrá consultar además a los Editores asociados. El proceso de revisión será "doble ciego". En todo el proceso de revisión se mantendrá el principio de confidencialidad por parte de los revisores hacia el trabajo que revisan, así como la confidencialidad de los nombres de los revisores entre ellos o ante los autores del manuscrito. En este sentido las revisiones serán anónimas, confidenciales y ciegas también para los revisores que no conocerán el nombre de los autores en ningún momento.

El resultado de la revisión del manuscrito será enviado al autor de correspondencia indicando la decisión editorial. Los autores, si es el caso, deberán hacer los cambios señalados por editores y/o revisores, en un plazo máximo de dos meses, enviando:

- Una copia del manuscrito revisado resaltando los cambios.
- Una copia del manuscrito definitivo.
- Un documento de respuesta a revisores, donde se expongan de forma detallada las principales modificaciones efectuadas, así como sus propios comentarios sobre los principales aspectos de la revisión.

5. PROCESO DE PUBLICACIÓN

Una vez aceptado el artículo, se seguirá el siguiente proceso:

1. Se les remitirá una versión con posibles correcciones de formato y estilo, a la que deberán responder en un máximo de 10 días.
2. Una vez recibida respuesta por parte de los autores, se les informará de una estimación de las páginas que ocupará la versión final del artículo en la revista, y del coste de publicación del mismo.
3. Una vez se haya efectuado el pago, el artículo será traducido al inglés o español, dependiendo del idioma original.
4. Se generará un documento final o galerada que los autores también revisarán.
5. Se asignará un DOI al mismo y se publicará en avance online, hasta que se asignen páginas dentro de un volumen concreto en el que finalmente serán publicados los manuscritos.

Los autores son totalmente responsables de la versión final que se publique. Los autores pueden hacer el uso que crean pertinente para la difusión del artículo, siempre que quede clara toda la información necesaria acerca de la revista donde ha sido publicado.

Costes de publicación

La Revista Adicciones es *Open Access*, es decir, de acceso abierto, por lo que una vez publicados los artículos estarán disponibles a través de la web y las distintas plataformas de búsqueda de forma gratuita, pudiendo ser enviados y compartidos a toda la comunidad científica. Esto supone que se deben cubrir una serie de gastos de edición, maquetación y derechos de difusión que conllevan asociados unos costes para los autores de los manuscritos. El proceso de publicación Open Access cumple con los requisitos y recomendaciones establecidos por las convocatorias de financiación científica más actuales como la Horizon 2020 y la Ley de Ciencia del Ministerio de Ciencia e Innovación de España, que promueven el acceso abierto a la ciencia.

La publicación de nuevos artículos está sujeta al pago de 50€ (IVA incluido) por página, con un descuento del 30% si el primer autor es socio de Socidrogalcohol. Para los casos en los que al menos un 50% de los autores pertenezcan a países en desarrollo según **World Bank**, se aplicará un descuento del 50%. Excepcionalmente, si existen dificultades graves de financiación y ante artículos de gran calidad, se podrá negociar una tarifa de publicación

6. COPYRIGHT

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Los autores se comprometen a acompañar el manuscrito de todos los permisos correspondientes para reproducir material previamente publicado que se va a incluir en el manuscrito, como texto, tablas, figuras, etc.

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EDITORIAL

ORIGINALES / ORIGINALS

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Sociedad Científica Española de Estudios sobre el Alcohol, el Alcoholismo y las otras Toxicomanías

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SECRETARÍA DE ESTADO DE SANIDAD
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