ORIGINAL

Waterpipe use among adolescents. Possible implications and related variables

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

Nuria García-Couceiro*, Manuel Isorna**, Teresa Braña***, Jesús Varela***, Manuel Gandoy-Crego*, Antonio Rial***.

* Departamento de Psiquiatría, Radiología, Salud Pública, Enfermería y Medicina. Universidad de Santiago de Compostela, España.

** Departamento de Análisis e Intervención Psicoeducativa. Universidad de Vigo, España.

*** Departamento de Psicología Social, Básica y Metodología. Universidad de Santiago de Compostela, España.

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

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

Nuria García-Couceiro, Manuel Isorna, Teresa Braña, Jesús Varela, Manuel Gandoy-Crego, Antonio Rial

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
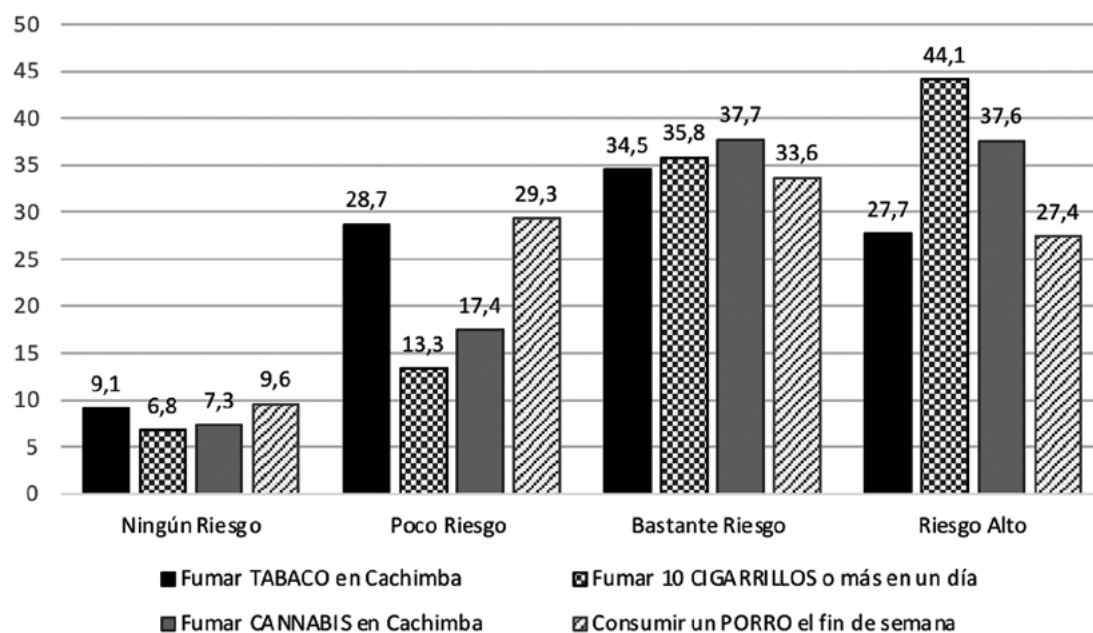Perceived risk of tobacco and waterpipe cannabis smoking (%)

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.

Acknowledgments

Conflict of interests

The authors of this article declare no conflict of interest.

References

Agaku, I. T., Filippidis, F. T., Vardavas, C. I., Odukoya, O. O., Awopegba, A. J., Ayo-Yusuf, O. A. & Connolly, G. N. (2014). Poly-tobacco use among adults in 44 countries during 2008–2012: Evidence for an integrative and comprehensive approach in tobacco control. *Drug and Alcohol Dependence*, *139*, 60-70. doi:10.1016/j.drugalcdep.2014.03.003.

Al-Naggar, R. A. & Bobryshev, Y. V. (2012). Shisha smoking and associated factors among medical students in Malaysia. *Asian Pacific Journal of Cancer Prevention*, *13*, 5627-5632. doi:10.7314/APJCP.2012.13.11.5627.

Babor, T. F., Kranzler, H. R. & Lauerman, R. J. (1989). Early detection of harmful alcohol consumption: Comparison of clinical, laboratory, and self-report screening procedures. *Addictive Behaviors*, *14*, 139-157. doi:10.1016/0306-4603(89)90043-9.

Bahelah, R., DiFranza, J. R., Fouad, F. M., Ward, K. D., Eissenberg, T. & Maziak, W. (2016). Early symptoms of nicotine dependence among adolescent waterpipe smokers. *Tobacco Control*, *25*, 127-134. doi:10.1136/tobaccocontrol-2015-052809.

Beck, F., Legleye, S. & Observatoire français des drogues et des toxicomanies. (2003). *Drogues et adolescence usages de drogues et contextes d'usage entre 17 et 19 ans, évolutions récentes ESCAPAD 2002*. Paris: OFDT.

Chabrol, H., Massot, E., Montovany, A., Chouicha, K. & Armitage, J. (2002). Modes de consommation, représentations du cannabis et dépendance: Étude de 159 adolescents consommateurs. *Archives de Pédiatrie*, *9*, 780-788. doi:10.1016/S0929-693X(01)00989-7.

Chabrol, H., Roura, C. & Armitage, J. (2003). Bongs, a method of using cannabis linked to dependence. *The Canadian Journal of Psychiatry*, *48*, 709-709. doi:10.1177/070674370304801011.

Cobb, C. O., Shihadeh, A., Weaver, M. F. & Eissenberg, T. (2011). Waterpipe tobacco smoking and cigarette smoking: A direct comparison of toxicant exposure and subjective effects. *Nicotine and Tobacco Research*, *13*, 78-87. doi:10.1093/ntr/ntq212.

Daniels, K. E. & Roman, N. V. (2013). A descriptive study of the perceptions and behaviors of waterpipe use by university students in the Western Cape, South Africa. *Tobacco Induced Diseases*, *11*, 4. doi:10.1186/1617-9625-11-4.

Darawshy, F., Abu, A., Kuint, R. & Berkman, N. (2021). Waterpipe smoking: A review of pulmonary and health effects. *European Respiratory Review: An Official Journal of the European Respiratory Society*, *30*. doi:10.1183/16000617.0374-2020.

Eissenberg, T. & Shihadeh, A. (2009). Waterpipe tobacco and cigarette smoking. *American Journal of Preventive Medicine*, *37*, 518-523. doi:10.1016/j.amepre.2009.07.014.

Fu, M., Feliu, A. & Fernández, E. (2020). Cachimbas: Otra forma de fumar tabaco… Otra fuente de exposición a compuestos tóxicos. *Archivos de Bronconeumología*, S0300289620303781. doi:10.1016/j.arbres.2020.10.001.

Funder, D. C. & Ozer, D. J. (2019). Evaluating effect size in psychological research: Sense and nonsense. *Advances in Methods and Practices in Psychological Science*, 2, 156–168. doi:10.1177/2515245919847202.

Galindo, C., González, A. C., Espigares, E. & Moreno, E. (2019). Riesgo para la salud pública de fumar tabaco en cachimba. *Higiene y Salud Ambiental*, *19*, 1775-1785.

García-Couceiro, N., Golpe, S., Braña, T., Varela, J. & Rial, A. (2020). Cannabis Abuse Screening Test (CAST). Garantías psicométricas para la detección del consumo de riesgo en adolescentes. In *Isorna M, Villanueva V, Rial A, coordinadores. Cannabis: Evidencia científica vs. Controversia social* (pp. 137-148). Dykinson.

García-Couceiro, N., Isorna, M., Varela, J., Gandoy-Crego, M., Braña, T. & Rial, A. (2020). El fenómeno del botellón. Análisis descriptivo y posibles implicaciones a partir de una muestra de adolescentes gallegos. *Revista Española De Salud Pública*, *94*, e202011171.

Gutiérrez-Abejón, E., Rejas-Gutiérrez, J., Criado-Espegel, P., Campo-Ortega, E. P., Breñas-Villalón, M. T. & Martín-Sobrino, N. (2015). Impacto del consumo de tabaco sobre la mortalidad en España en el año 2012. *Medicina Clínica*, *145*, 520-525. doi:10.1016/j.medcli.2015.03.013.

Hall, W., Degenhardt, L. & Teesson, M. (2009). Reprint of "Understanding comorbidity between substance use, anxiety and affective disorders: Broadening the research base". *Addictive Behaviors*, *34*, 795-799. doi:10.1016/j.addbeh.2009.03.040.

Haroon, M., Munir, A., Mahmud, W. & Hyder, O. (2014). Knowledge, attitude, and practice of water-pipe smoking among medical students in Rawalpindi, Pakistan. *JPMA. The Journal of the Pakistan Medical Association*, *64*, 155-158.

Jawad, M., Charide, R., Waziry, R., Darzi, A., Ballout, R. A. & Akl, E. A. (2018). The prevalence and trends of waterpipe tobacco smoking: A systematic review. *PLOS ONE*, *13*, e0192191. doi:10.1371/journal.pone.0192191.

Jorge-Araujo, P., Torres-García, M., Marrero-Montelongo, M. & Navarro-Rodríguez, C. (2018). Creencias y actitudes de adolescentes españoles hacia el consumo de tabaco en pipa de agua. *Enfermería Global*, *17*, 65-85. doi:10.6018/eglobal.17.2.278471.

Jorge-Araujo, P., Torres-García, M., Saavedra-Santana, P. & Navarro-Rodríguez, C. (2017). Consumo de tabaco en pipa de agua en estudiantes españoles de secundaria y bachillerato de la provincia de Las Palmas. *Health and Addictions/Salud y Drogas*, *17*, 121. doi:10.21134/haaj.v17i1.296.

Knight, J. R., Shrier, L. A., Bravender, T. D., Farrell, M., Vander Bilt, J. & Shaffer, H. J. (1999). A new brief screen for adolescent substance abuse. *Archives of Pediatrics and Adolescent Medicine*, *153*, 591-596. doi:10.1001/archpedi.153.6.591.

Ley 28/2005, de 26 de diciembre, de medidas sanitarias frente al tabaquismo y reguladora de la venta, el suministro, el consumo y la publicidad de los productos del tabaco. Boletín Oficial del Estado, 309, de 27 de diciembre de 2005, 42241 a 42249. https://www.boe.es/eli/es/l/2005/12/26/28.

Llorens, N., Barrio, G., Sánchez, A., Suelves, J. M. & ESTUDES Working Group. (2011). Effects of socialization and family factors on adolescent excessive drinking in Spain. *Prevention Science: The Official Journal of the Society for Prevention Research*, *12*, 150-161. doi:10.1007/s11121-010-0195-0.

Lorza, J. J. (2019). Formas emergentes en el consumo de nicotina. *Archivos de Bronconeumología*, *55*, 71-72. doi:10.1016/j.arbres.2018.03.024.

Martinasek, M. P., McDermott, R. J. & Martini, L. (2011). Waterpipe (hookah) tobacco smoking among youth. *Current Problems in Pediatric and Adolescent Health Care*, *41*, 34-57. doi:10.1016/j.cppeds.2010.10.001.

Maziak, W. (2011). The global epidemic of waterpipe smoking. *Addictive Behaviors*, *36*, 1-5. doi:10.1016/j.addbeh.2010.08.030.

Maziak, W., Rastam, S., Shihadeh, A. L., Bazzi, A., Ibrahim, I., Zaatari, G. S.,… Eissenberg, T. (2011). Nicotine exposure in daily waterpipe smokers and its relation to puff topography. *Addictive Behaviors*, *36*, 397-399. doi:10.1016/j.addbeh.2010.11.013.

Maziak, W., Taleb, Z. B., Bahelah, R., Islam, F., Jaber, R., Auf, R. & Salloum, R. G. (2015). The global epidemiology of waterpipe smoking. *Tobacco Control*, *24* (*Suppl. 1*), 3-12. doi:10.1136/tobaccocontrol-2014-051903.

Observatorio Español de las Drogas y las Adicciones y Delegación del Gobierno para el Plan Nacional sobre Drogas. (2019). *Encuesta sobre alcohol y otras drogas en España (EDADES) 2017-2018*. Madrid, España: Delegación del Gobierno para el Plan Nacional sobre Drogas, Ministerio de Sanidad, Servicios sociales e Igualdad.

Observatorio Español de las Drogas y las Adicciones y Delegación del Gobierno para el Plan Nacional sobre Drogas. (2020). *Encuesta sobre el uso de drogas en enseñanzas secundarias en España (ESTUDES) 1994-2018/2019*. Madrid, España: Delegación del Gobierno para el Plan Nacional sobre Drogas, Ministerio de Sanidad, Servicios sociales e Igualdad.

Pérez-Ríos, M., Schiaffino, A., Montes, A., Fernández, E., López, M. J., Martínez-Sánchez, J. M.,… Galán, I. (2020). Mortalidad atribuible al consumo de tabaco en España 2016. *Archivos de Bronconeumología*, *56*, 559-563. doi:10.1016/j.arbres.2019.11.021.

Primack, B. A., Carroll, M. V., Weiss, P. M., Shihadeh, A. L., Shensa, A., Farley, S. T.,… Nayak, S. (2016). Systematic review and meta-analysis of inhaled toxicants from waterpipe and cigarette smoking. *Public Health Reports*, *131*, 76-85. doi:10.1177/003335491613100114.

Rial, A., Golpe, S., Braña, T. & Varela, J. (2017). Validación del «Test de Identificación de Trastornos por Consumo de Alcohol» (AUDIT) en población adolescente española. *Behavioral Psychology/Psicología Conductual*, *25*, 371-386.

Rial, A., Kim-Harris, S., Knight, J. R., Araujo, M., Gómez, P., Braña, T.,… Golpe, S. (2018). Validación empírica del CRAFFT Abuse Screening Test en una muestra de adolescentes españoles. *Adicciones*, *31*, 160. doi:10.20882/adicciones.1105.

Rial, A., Varela, J. & Rojas, A. J. (2001). Depuración y análisis preliminares de datos en SPSS: Sistemas informatizados para la investigación del comportamiento. RA-MA.

Sáenz-Lussagnet, J. M., Rico-Villademoros, F. & Luque, L. G. (2018). Consumo de pipas de agua y cigarrillos entre adolescentes de Sevilla (España): Prevalencia y potenciales determinantes. *Adicciones*, *31*, 170. doi:10.20882/adicciones.1112.

Saunders, J. B., Aasland, O. G., Amundsen, A. & Grant, M. (1993). Alcohol consumption and related problems among primary health care patients: WHO collaborative project on early detection of persons with harmful alcohol consumption-I. *Addiction*, *88*, 349-362. doi:10.1111/j.1360-0443.1993.tb00822.x.

Saunders, J. B., Aasland, O. G., Babor, T. F., De La Fuente, J. R. & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction*, *88*, 791-804. doi:10.1111/j.1360-0443.1993.tb02093.x.

Shepardson, R. L. & Hustad, J. T. P. (2016). Hookah tobacco smoking during the transition to college: Prevalence of other substance use and predictors of initiation. *Nicotine and Tobacco Research*, *18*, 763-769. doi:10.1093/ntr/ntv170.

Shihadeh, A., Schubert, J., Klaiany, J., El Sabban, M., Luch, A. & Saliba, N. A. (2015). Toxicant content, physical properties and biological activity of waterpipe tobacco smoke and its tobacco-free alternatives. *Tobacco Control*, *24 (Suppl. 1)*, 22-30. doi:10.1136/tobaccocontrol-2014-051907.

Sutfin, E. L., Song, E. Y., Reboussin, B. A. & Wolfson, M. (2014). What are young adults smoking in their hookahs? A latent class analysis of substances smoked. *Addictive Behaviors*, *39*, 1191-1196. doi:10.1016/j.addbeh.2014.03.020.

Tetrault, J. M. (2007). Effects of marijuana smoking on pulmonary function and respiratory complications: A systematic review. *Archives of Internal Medicine*, *167*, 221. doi:10.1001/archinte.167.3.221.

Winters, K. C., Stinchfield, R. D., Henly, G. A. & Schwartz, R. H. (1990). Validity of adolescent self-report of alcohol and other drug involvement. *The International Journal of the Addictions*, *25*, 1379-1395. doi:10.3109/10826089009068469.