



Perceived risk of occasional conventional and electronic cigarette smoking in adolescents

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Abstract

Introduction: research into drug consumption agrees on the relationship between the perception of the risk associated with the consumption of a substance and the probability of consuming it.

Objective: to find out the perception of danger in the occasional consumption of conventional and electronic cigarettes in adolescents aged between 13 and 18 attending school in Castile & Leon (academic year 2014-2015), as well as their relation with other sociodemographic factors.

Material and methods: a standardized, telematic and anonymous questionnaire was used with analogous questions to those used in national and international programmes to discover the risk perception concerning the consumption of drugs among adolescents. A descriptive, cross-sectional study with a random, two-stage cluster sample was also used. A probability of 50% was estimated in all our answers, with a confidence interval of 95.5% and an error probability in bilateral contrast of 1.7%. The final sample was made up of 3,311 adolescents (mean age 14.8±1.3 years).

Results: we found a high perception of risk for the occasional consumption of tobacco among adolescents (74.3% considering it very dangerous, n = 2458). However, with the electronic cigarette there is a lower perception of risk (only 65.9% considered it to be very dangerous), with no statistically significant differences in relation to age or family functionality (p < 0.005 respectively). Women (odds ratio: 1.28) and adolescents from public centres (p ≤ 0.01 respectively) show a lower perception of danger.

Conclusions: the e-cigarettes could become an additional way of initiating tobacco smoking in adolescents due to their accessibility, their attractive flavours and the low perception of danger associated with their consumption in early adolescence.

Key words:

- Teenagers
- Abuse drugs
- Electronic cigarette
- Alcohol drinking

Riesgo percibido sobre el consumo ocasional de tabaco tradicional y electrónico en adolescentes

Resumen

Introducción: existe una relación entre la percepción de riesgo asociada al consumo de una sustancia y la probabilidad de consumirla. **Objetivo:** conocer la percepción de peligrosidad del consumo ocasional de tabaco convencional y electrónico en adolescentes entre 13 y 18 años escolarizados en Castilla y León (España) (curso 2014-15), así como su relación con otros factores sociodemográficos.

Material y métodos: estudio descriptivo transversal con un muestreo aleatorio bietápico por conglomerados. Para calcular el tamaño de la muestra se estimó una probabilidad del 50% en todas nuestras respuestas, un margen de confianza del 95,5% y una probabilidad de error en contraste bilateral del 1,7%. Se utilizó un cuestionario estandarizado, telemático y anónimo, con preguntas análogas a las utilizadas en programas nacionales e internacionales para conocer la percepción de riesgo sobre el consumo de drogas en adolescentes.

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Palabras clave:

- Adolescentes
- Drogas
- Cigarrillo electrónico
- Consumo de alcohol

Resultados: la muestra final fue de 3311 adolescentes (media de edad $14,8 \pm 1,3$ años). Encontramos una elevada percepción de peligrosidad del consumo ocasional de tabaco en adolescentes (lo consideran muy peligroso el 44,2%, $n = 1469$). Sin embargo, el cigarrillo electrónico goza de una menor percepción de riesgo (lo consideran muy peligroso el 18,5%, $n = 616$), sin diferencias estadísticamente significativas en relación con la edad ni con la funcionalidad familiar. Las mujeres (*odds ratio*: 1,28) y los adolescentes de centros públicos (*odds ratio*: 1,32) presentan menor percepción de peligrosidad ($p < 0,05$ respectivamente).

Conclusiones: los cigarrillos electrónicos podrían convertirse en una vía adicional de iniciación al tabaquismo en adolescentes por su accesibilidad, sus atractivos sabores y la baja percepción de peligrosidad asociada a su consumo en la adolescencia temprana.

INTRODUCTION

It could be said that smoking has ceased to be a socially accepted behaviour since restrictions on tobacco use were approved in Spain in 2010.¹ This increased social awareness of the hazards of smoking and has led to a decrease in the number of Spanish adolescents that smoke.^{2,3}

Adolescence is a key period, as it is the time most adult smokers started using tobacco. There are studies that suggest that electronic cigarettes can be a gateway to conventional smoking in adolescents, and that they are used for recreational purposes rather than for quitting smoking.⁴⁻⁷

Electronic cigarettes (e-cigarettes) are devices consisting of a battery, an atomizer and a fluid tank that allows inhaling vapour similarly to the way smoke is inhaled in a conventional cigarette.⁸ E-cigarette fluids contain different concentrations of nicotine and a flavouring substance suspended in a base that is usually a chemical like propylene glycol (a lung irritant)⁹ or vegetable glycerine (which has been associated with lipoid pneumonia).¹⁰

E-cigarettes appeal to adolescents for many reasons. First of all, they are more affordable than conventional cigarettes.¹¹ Secondly, fluids with sweet flavourings are appealing to children and adolescents (such as bubble gum, soft fruit candy or strawberry shortcake flavours)^{12,13} are perceived as less harmful than tobacco flavours¹⁴ and detach the traditional image of the smoker from the act of smoking.¹² Thirdly, the marketing of e-cigarettes avoids the negative stereotypes of traditional

smokers, is very aggressive and recalls the promotion of tobacco in the 1950s and 1960s,¹⁵ associating e-cigarettes with sex, rebelliousness and group identity.¹⁶ Advertisements also attribute countless properties to e-cigarettes, most of which are not supported by scientific evidence (such as the efficacy of Vapotrim for weight loss)¹⁷; other potential advantages are currently under study, and temporary results are contradictory. Marketing materials are easily found online,^{6,18} bypassing a significant number of parental controls. Fourthly, the available information is controversial, as some health authorities have declared electronic cigarettes less harmful than conventional tobacco,¹⁹ even though they are as addictive and have the same short-term respiratory effects as conventional cigarettes.¹⁰ Fifth of all, vaping or refilling an e-cigarette may be novelties, but there is a risk of poisoning through dermal exposure during refilling,^{10,11} and the devices can be used to smoke cannabis or other substances laced with tetrahydrocannabinol (THC) following the alchemy tutorials offered in many websites, which opens the door to multiple manipulations of the smoked contents.

Since their introduction in Spain in early 2011, there has been a rapid growth in the use of e-cigarettes that was partly mitigated by the publication in March 2014 by the Health Care and Social Services Committee of the Spanish parliament of a ban on vaping and on the advertising of nicotine-delivering electronic cigarettes in indoor public spaces and at times children are likely to be present (4 to 8 PM),⁸ although online sales and advertising of electronic cigarettes and fluids remained unregulated.

In adolescents, the perceived risk of consuming a substance is associated with the actual probability of using it,² and this applies to electronic cigarettes.²⁰ Furthermore, tobacco and alcohol function as gateways to other maladaptive or risk behaviours (cannabis use, sexual behaviours, sedentary lifestyles...) in adolescents.²¹

The aim of this study was to assess the perceived risk of occasional conventional and electronic cigarette smoking in adolescents living in Castilla y León (Spain) and identify sociodemographic or family functioning factors associated with this perception.

Our working hypothesis was that adolescents in Castilla y León perceive electronic cigarettes as a lesser risk compared to conventional tobacco.

MATERIALS AND METHODS

Population under study

The population under study were students aged 13 to 18 years enrolled in years 2, 3, and 4 of Spanish compulsory secondary education (Educación Secundaria Obligatoria [ESO]), years 1 and 2 of non-compulsory secondary education (Bachillerato) as defined by the Organic Law on Education (Ley Orgánica de Educación [LOE]) or years 1 and 2 of vocational education (Formación Profesional [FP]) in schools of the autonomous community of Castilla y León. The total number of these students in the 2014-2015 academic year, which we obtained from the listings of the Department of Education of the Government of Castilla y León, was 115 042.

We excluded students aged 13 to 18 years enrolled in elementary education, higher education, special education in the framework of Social Guarantee Programmes (except in Valladolid), distance education or night school, and those who were absent from school on the date and hour that the questionnaire was administered.

Sample

We calculated the minimum sample size (n) for an estimated proportion of 50% in every answer, a probability of error in the two-tailed test of 1.7%, a confidence level of 95.5% and with the assumption that 16% of questionnaires would not be completed, and found that we needed a total of 2829 students. The distribution of the sample in terms of sex, type of school and type of setting (urban/rural) had to match that of the population we wished to represent. We performed multistage cluster sampling using a random number table (Fisher and Yates) to obtain an initial sample of 37 schools, and subsequently including all the students in the selected classrooms.

Questionnaire and fieldwork

The questionnaire we used followed the recommendations of the World Health Organization (WHO)²² for the development of school-based surveys on substance use. The questionnaire was self-administered in the classroom and completely anonymous. Students completed an electronic version of the questionnaire that they accessed with keys assigned randomly to each student. **Table 1** presents the questionnaire items and the answer choices.

After obtaining the approval of all necessary parties (Department of Education of Castilla y León, Province Directorates of Education, Ethics Committee, Research Committee of the Hospital Río Hortega of Valladolid and informed consent of the legal guardians of the students), we surveyed a final sample of 3673 students between April 1, 2014 and April 30, 2015 using the computer systems of participating schools.

Responses downloaded automatically and in real time to a database in an external network that was not managed by the research team. The study adhered to the ethical principles of the Declaration of Helsinki and safeguarded the anonymity and confidentiality of participants.

Table 1. Questions pertaining to alcohol use, tobacco use and alcohol intoxication in the past 3 months, the perceived risk associated with the use of conventional and electronic cigarettes, and the socioeconomic status of the household

Question	Answer choices
How often did you smoke in the past 3 months?	Never / One weekend / 1–4 times / Every weekend / Regularly (=daily smoker)
How often did you have alcohol in the past 3 months?	Never / One weekend / 1–4 times / Every weekend / Regularly
How often did you get drunk in the past 3 months?	Never / One weekend / 1–4 times / Every weekend / Regularly
How often did you go out at night in the past 3 months?	Never / One weekend / 1–4 times / Every weekend / Regularly
How do you perceive smoking tobacco some day?	A great risk-a risk/ A moderate risk-not a risk if under control/Not a risk
How do you perceive ever smoking electronic cigarettes?	A great risk-a risk/ A moderate risk-not a risk if under control/Not a risk
How is the financial situation in your household?	Affluent (“we can afford major or moderate unexpected expenses”) / Good (“we can afford moderate unexpected expenses without concern”, for instance: a new pair of glasses, a child’s end-of-year trip abroad) / Normal (“we can afford minor unexpected expenses and if we save for a while we can afford extras: courses abroad, new glasses ...”) / Poor (“we cannot afford unexpected minor expenses and by the end of the month we no longer buy groceries, we eat whatever we have at home or have food at the house of our grandparents or other relatives...”) / Very poor (“we have unmet needs at home, we receive help from relatives, we have moved back with our grandparents for financial reasons ...”)

Statistical analysis

The statistical analysis was overseen by the Research Unit of the Hospital Río Hortega of Valladolid. We have described quantitative variables as mean and standard deviation (SD) after verifying the normality of the distribution with the Kolmogorov-Smirnov test, and qualitative variables as absolute and relative frequencies (percentages). We calculated the 95% confidence intervals (CIs) of the resulting statistics and calculated the percentage of missing responses. To analyse the association between the perceived risk of occasional smoking (conventional or electronic) and other variables (such as sociodemographic, risk or protective factors) we used the χ^2 with Fisher’s exact test or the likelihood ratio, depending on the conditions. We defined statistical significance as a *p*-value of less than 0.05 in any of the tests. The statistical analysis was performed with the software package SPSS® version 15.0 (SPSS Inc, 1989–2006) (license of the Unit of Research and Statistics of the Hospital Río Hortega de Valladolid).

RESULTS

The final sample, after cleansing the data and eliminating incomplete responses, comprised 3311 adolescents aged 13 to 18 years whose characteristics are described in **Table 2**.

We found no statistically significant differences in the distribution by sex, type of school and type of setting between the study sample and the population (*P* > .05). Overall, the sample was representative of the population of students aged 13 to 18 years in Castilla y León.

When it came to how the students perceived the risk of conventional smoking, we found that 74.3% considered it a risk, 20.2% a small risk and 5.4% (*n* = 182) not a risk.

As for the perceived risk of smoking electronic cigarettes, we found that 65.9% of students (*n* = 2184) considered it a risk, 32% a small risk and 2.3% not a risk.

In regards to the past 3 months, 7.3% of students reported being daily smokers, while 8.8% reported

Table 2. Characteristics of the study sample

	Sample (3311)		Castilla y León ^a (11 504 223)	
	n	%	N	%
Male	1605	48,5	58 425	50,7
Age	n	%	N	%
13 years	669	20.2	20 224	17.6
14 years	776	23.4	21 186	18.4
15 years	883	26.7	20 842	18.1
16 years	601	18.2	20 812	18
17 years	310	9.4	20 391	17.7
18 years	72	2.1	11 587	9.9
Type of school	n	%	N	%
Public + FP	2345	70.8	73 182	71.3%
Publicly funded independent school	659	19.9	20 638	20%
Private ^b	307	9.3	8844	8.6%
Resident in rural setting^c	969	29.3	33 674	32.8%
Socioeconomic status	n	%	Household income	
Affluent	262	7.9	> 3000 €/month	12.3%
Good	1304	39.4	1500–3000 €/month	40.7%
Average	1526	46.1	1000–1500 €/month	34.8%
Poor	203	6.1	500–1000 €/month	11.6%
Very poor	16	0.5	< 500 €/month	0.6%
Paternal educational attainment	n	%	Men aged > 30 and < 60 years	
No education	542	16.3	3.2%	
Elementary (up to ESO)	1254	37.8	52.7%	
Secondary (FP, vocational)	712	21.5	24.4%	
Higher education	803	24.3	19.2%	
Maternal educational attainment	n	%	Women aged > 30 and < 50 years	
No education	404	12.2	1.8%	
Elementary education	1043	31.5	53.3%	
Secondary education	756	22.8	19.9%	
Higher education	1108	33.5	28.6%	

^aPopulation of students aged 13 to 18 years in the 2014–2015 academic year. ^bYears for which full tuition had to be paid in publicly funded independent schools (Bachillerato, FP) were classified as private. ^cRural: Towns with population < 10 000 inhabitants. ^dRural: núcleos de población < 10 000 habitantes. ^eInformación procedente del boletín estadístico de la Junta de Castilla y León de 2015.

occasional use (4.8% smoked only at weekends and 4% sporadically). The estimated risk (odds ratio [OR]) of using alcohol in students that had ever smoked was 26.68 ($P < .001$). The risk of getting drunk was 16.7 times greater (OR) in adolescents that had ever smoked compared to those that had never tried tobacco ($P < .001$).

When we analysed self-reported alcohol use in the past 3 months, we found that 4.5% of adolescents in Castilla y León reported drinking daily ($n = 149$) and 36.8% drinking occasionally (23.2% at weekends).

When we asked how frequently they had become inebriated in the past 3 months, 2.9% ($n = 96$) reported having got drunk often (more than 12 times); 7.4% ($n = 245$) every weekend; 6.6% ($n = 219$) between once and four times, and 8% ($n = 265$) once.

In our survey, 57.5% of adolescents aged 13 to 18 years reported not having used alcohol or tobacco in the past 3 months.

Changes in use and perceived risk based on age

The students that had ever smoked had a mean age of 15.22 ± 1.45 years, and amounted to 11.7% of those aged 13 years, 12.4% of those aged 14 years, 13.7% of those aged 15 years, 22% of those aged 16 years, 27.1% of those aged 17 years and 22.9% of those aged 18 years (χ^2 , 78.936 [7]; $P < 0.001$; significantly greater proportion of students aged 16 years or older). We observed a similar trend in the proportion of daily smokers: 4.5% of students aged 13 or 14 years, 6.3% of those aged 15 years, 9.3% of those aged 16 years and 18.1% of those aged 17 or 18 years (Fisher’s exact test, 125.2 [28], $P < .001$; greater proportion of adolescents aged 17 years or older). When we analysed the perceived risk of occasional tobacco smoking, which is associated with the probability of tobacco use, we found that perceived risk decreased with increasing age, although this trend only became clear from age 15 years (age at which 49.3% of students considered it a great risk and 31% a risk). At age 18 years, 30% considered it a great risk and 18.7% a risk.

When we assessed the perceived risk associated with smoking electronic cigarettes, the findings were quite revealing, as it did not vary with age in adolescents aged 13 to 17 years, 18.5% of who considered it a great risk and 47.3% considered it a risk (the trend shifted at age 18 years, with 43% categorising it as a great risk and 20.8% as a risk). When it came to adolescents that perceived “no risk” in trying electronic cigarettes, we found that the odds ratio of belonging to this group at age 16 years compared to older ages was 6 ($P < .001$).

Sex differences

We did not find differences based on sex on the proportion of daily or occasional smokers or the

perceived risk of sporadically smoking conventional cigarettes.

We did find differences between sexes in the perceived risk of electronic cigarette smoking (χ^2 , 50.74 [5], $P < .001$) (Table 3).

Table 4 summarises the results of the analysis of other factors associated with tobacco use and the perceived risk of occasional consumption of conventional or electronic cigarettes.

DISCUSSION

Adolescents in Castilla y León perceive the risk associated with using electronic cigarettes as lesser than the risk associated with the use of conventional tobacco. This finding is consistent with those of multiple studies conducted abroad,²⁵⁻²⁷ some of which have reported striking figures—the study by Goniewicz et al,²⁶ for instance, found that up to 54.8% of youths aged 15 to 19 years believed that electronic cigarettes were safer than conventional cigarettes.

We ought to highlight that, in opposition to the trends observed for most traditional substances (tobacco, cocaine...), in our study the perceived risk associated with the occasional use of electronic cigarettes did not decrease with age, but remained constant from early adolescence, which increases the probability of initiation through middle adolescence and the development of dependency. This is consistent with the findings of other authors, such as Pepper et al,⁷ who found that adolescents aged 14 to 16 years were twice more likely (OR, 2.12) to start using e-cigarettes than individuals aged 11 to 13 years or 17 to 19 years. A study found that 10% of French adolescents that had tried e-cigarettes had never smoked conventional tobacco. Furthermore, the age of these adolescents was

Table 3. Perception of risk associated with e-cigarette smoking by sex

Perceived risk of e-cigarette use	Great risk	Risk	No risk if under control	Small risk	No risk
Male students	377 (23.5%)	726 (45.2%)	425 (26.4%)	35 (2.2%)	42 (2.6%)
Female students	237 (13.9%)	841 (49.3%)	548 (32%)	46 (2.6%)	34 (2%)

Table 4. Other factors associated with the use of tobacco and the perceived risk of occasionally using conventional and electronic cigarettes

	OR	P	95% CI
Tobacco use			
Reported socioeconomic status: Low / High	1.383	.05	1.01–1.84
Academic performance: Poor / Good	1.64	< .001	1.31–2.06
Residential setting: Rural / Urban	1.39	< .001	1.11–1.73
Paternal educational attainment: elementary / secondary-higher	1.24	.02	1.15–1.3
Maternal educational attainment: elementary / secondary-higher	1.06	.12	1.01–1.08
Going out at night (> 10 pm): weekdays / weekends	3.95	< .001	3–5
Do you feel loved by your family? (affection*) Sometimes-never / Always	1.43	< .001	1.3–1.5
Are you satisfied with the time you spend together with your family? (resources*): Sometimes-never / Always	1.829	< .001	1.78–1.87]
When you are with your parents, can you speak freely and honestly about is happening to you, your concerns, or the problems that arise between you at home? (growth*) Sometimes-never / Always	1.85	< .001	1.66–1.99
Category of family functioning (APGAR): Dysfunctional-moderately dysfunctional / Functional	2.59	< .001	2.42–2.81
Low perceived risk of occasional tobacco use			
Reported socioeconomic status: Low / High	0.77	.02	0.72–0.82
Academic performance: Poor / Good	1.64	< .001	1.31–2.06
Type of school: Public / Private	3.72	< .001	3.12–4.32
Residential setting: Rural / Urban	1.68	.002	1.59–1.77
Paternal educational attainment: elementary / secondary-higher	1.11	.002	1.05–1.19
Maternal educational attainment: elementary / secondary-higher	1.1	.03	1.08–1.19
Going out at night: weekdays / weekends	3.02	< .001	2.58–3.46
Do you feel loved by your family? (affection) Sometimes-never / Always	1.62	< .001	1.51–1.73
Are you satisfied with the time you spend together with your family? (resources): Sometimes-never / Always	1.16	.05	1.09–1.23
When you are with your parents, can you speak freely and honestly about is happening to you, your concerns, or the problems that arise between you at home? (growth) Sometimes-never / Always	1.49	.014	1.19–1.79
Category of family functioning (APGAR): Dysfunctional-moderately dysfunctional / Functional	1.69	< .001	1.49–1.89
Low perceived risk of occasional electronic cigarette use			
Reported socioeconomic status: Low / High	1.088	.569	0.81–1.45
Academic performance: Poor / Good	0.958	.614	0.8–1.1
Type of school: Public / Private	1.32	< .001	1.12–1.48
Residential setting: Rural / Urban	1.11	.08	0.99–1.25
Paternal educational attainment: elementary / secondary-higher	1.02	.55	0.95–1.09
Maternal educational attainment: elementary / secondary-higher	0.99	.85	0.91–1.08
Going out at night: weekdays / weekends	1.03	.11	0.99–1.06
Daily/Occasional smoker	0.90	.44	0.82 –1
Smokes conventional tobacco daily/never	1.06	.41	1.01–1.15
Do you feel loved by your family? (affection) Sometimes-never / Always	0.884	.26	0.71–1.09
Are you satisfied with the time you spend together with your family? (resources): Sometimes-never / Always	1.04	.42	0.93–1.16
When you are with your parents, can you speak freely and honestly about is happening to you, your concerns, or the problems that arise between you at home? (growth) Sometimes-never / Always	0.99	.84	0.9–1.08
Category of family functioning (APGAR): Dysfunctional-moderately dysfunctional / Functional	1.05	.51	0.9–1.23

CI: confidence interval; OR: odds ratio.

*Affection, resources and growth are components of the family APGAR score.

significantly lower than the mean age of adolescents that started smoking conventional tobacco and tried e-cigarettes later on.²⁸ The reasons for the lesser risk perceived in early and middle adolescence compared to late adolescence may be, first, that the consumption of e-cigarettes in adolescents is not usually associated with an attempt to quit tobacco⁴; and second, that adolescents are receiving little information regarding electronic cigarettes.

Another salient finding of our study was the lesser perceived risk or greater likelihood to consume e-cigarettes found in female adolescents. We must note that this finding is consistent with the profile of smokers in Spain, where female adolescents have surpassed their male counterparts in the consumption of legal drugs.^{2,3} Another aspect that supports this finding is that there is advertising for e-cigarettes that specifically targets female adolescents (“Vapotrim for weight loss”).¹⁷ French female adolescents are also more likely to use e-cigarettes at ages 12, 13 and 17 years.²⁸ However, all other published studies have found that male adolescents were more likely to start using e-cigarettes.^{26,29} We believe that the reasons for this difference in Spain are of a cultural nature.

Adolescents attending public schools were more likely to smoke e-cigarettes than those attending private schools (OR, 1.32). The opposite has been observed in France, where consumption was higher in private school students.²⁸ These data would be hard to compare, as the educational systems of the two countries are not equivalent.

In our study, we found that the perceived risk of occasionally smoking e-cigarettes was lesser among sporadic users of conventional tobacco. There are inconsistencies between studies in this regard. Thus, a greater proportion of non-smokers had tried electronic cigarettes in a sample of Hungarian adolescents aged 13 to 15 years,¹¹ while 20.3% of non-smoking North American adolescents had tried e-cigarettes.^{4,5} Conversely, e-cigarette consumption was higher in adolescents that smoked conventional cigarettes in France, Lithuania and Korea.^{6,28}

The results of our assessment of social and family-related factors that may have a protective effect against e-cigarette use were inconclusive, and family functioning (family APGAR),²⁴ affection, family resources (time spent together) and communication did not appear to have a protective effect in terms of the perceived risk of e-cigarette smoking. A depressed mood was not a risk factor, either. We did not find studies on family-related risk factors for the use of electronic cigarettes in the literature, although Pepper et al⁷ found that a greater proportion of children of parents that did not smoke were willing to try them (22% compared to 5% of children of smokers). However, the results of our assessment of the effect of these family-related factors on the perceived risk of conventional smoking were consistent with those of most studies published on the subject.³⁰ The fact that we did not find these effects in relation to electronic cigarettes may reflect the lack of information of the parents and teachers of these adolescents.

The causes of the growing popularity of e-cigarettes among adolescents of Castilla y León are probably those already identified in studies conducted in other countries: the wide range of flavours,^{12,13} curiosity, the possibility of using the cigarette quickly and without producing smoke, how easily they are acquired, their low cost,¹¹ the lack of regulation and the considerable ignorance of society regarding this “new drug”. The latter distorts risk perception²⁵ and ultimately makes e-smoking a phenomenon whose impact should be evaluated in future research on substance use in Spain.

In our opinion, youth would benefit from the dissemination of clear and consistent information about e-cigarettes and their effects and similarities with conventional tobacco. Furthermore, given the perceived risk of this “new drug”, we can see that the pattern matches the pattern observed in conventional smoking, so it would be advisable to intensify campaigns addressed to the population subsets that are most vulnerable to e-cigarette use (adolescents that want to lose weight and feel

compelled to eat, that use cannabis...). We also believe that it is necessary to regulate fluid flavourings, adhering to the applicable directives of the European Parliament,³¹ force manufacturers to disclose all of their ingredients, and regulate on-line advertising.

Limitations of the study

We collected data on the mood of adolescents and household socioeconomic status with items that we created as opposed to standardised tools for the purpose, which may limit the validity of these measurements.

CONFLICTS OF INTEREST

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ABBREVIATIONS

CI: confidence interval • **ESO:** Secondary Compulsory Education • **FP:** Vocational Education • **LOE:** Organic Law on Education • **OR:** odds ratio • **THC:** tetrahydrocannabinol • **WHO:** World Health Organization.

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