Originales

Poppers use in a young Spanish population

El consumo de poppers en la población joven española

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Abstract

The use of *poppers* has traditionally been associated with sexualized settings; however, it has now expanded to other settings**. Objective**: This article aims to investigate the consumption of *poppers* among the young Spanish population. **Methodology**: The methodology developed was a mixed approach, combining quantitative data through an online survey and qualitative data through in-depth interviews and focus groups, with snowball sampling. The quantitative data were analyzed using SPSS, and the qualitative data were analyzed using Atlas.ti, allowing for triangulation of the information. **Results**: The results from both the statistical analysis and thematic content analysis show that *poppers* are mainly used in festive contexts by individuals who consume multiple psychoactive substances. **Conclusions**: The young Spanish population that consume *poppers* have a low perception of the associated risks, and the self-care strategies they adopt are aimed at minimizing adverse effects such as burns or headaches.

Keywords

Narcotic drugs; *poppers*; Health policy; Self-care strategies; Polysubstance use.

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Resumen

El consumo de *poppers* se ha asociado a entornos sexualizados pero actualmente, se ha extendido a otros ámbitos. **Objetivo:** Este artículo tiene como objetivo indagar sobre el consumo de *poppers* en la población joven española. **Metodología:** La metodología que desarrolló fue mixta cuantitativa mediante una encuesta en línea y cualitativa con entrevistas en profundidad y grupos de discusión, con muestreo tipo bola de nieve. Los datos cuantitativos se analizaron con SPSS y los cualitativos con Atlas.ti, permitiendo una triangulación de la información. **Resultados:** Los resultados del análisis, tanto estadístico como del contenido temático, muestran que el uso de *poppers* se da principalmente en contextos festivos entre personas que consumen múltiples sustancias psicoactivas. **Conclusiones:** la juventud española consumidora de *poppers* tienen baja percepción del riesgo asociado y las estrategias de cuidado que realizan están destinadas a minimizar efectos adversos como quemaduras o dolores de cabeza.

Palabras clave

Estupefaciente; *poppers*; política de la salud; estrategias de autocuidado; policonsumo.

INTRODUCTION

The use of *poppers* has historically been linked to sexualized practices within the homosexual community and among men who have sex with men (Íncera et al., 2022; Pepper et al., 2024). Currently, their use is expanding to individuals who use psychoactive substances in recreational settings, a phenomenon for which scientific literature remains limited (Van Dyck et al., 2023).

It is worth noting that neither the European Drug Report (EUDA, 2024) nor the Spanish Report on Alcohol, Tobacco, and Other Illicit Drugs (OEDA, 2024) explicitly addresses this substance. The former does not mention it, while the latter categorizes it with other substances that exhibit similar consumption patterns. This lack of in-depth analysis, both at the national and European levels, highlights the need to investigate patterns of use, risks, and self-care measures associated with this drug, particularly in emerging contexts, taking into account the interactions among the substance, the individual, and the setting. (Zinberg, 1984; Fernández et al., 2024).

What are *poppers*?

The World Health Organization defines a psychoactive substance as one that, upon entering the body, alters the central nervous system, potentially impacting mood, cognition, or behaviour, without necessarily inducing intoxication or overt impairments (Kramer & Cameron, 1975; Vantour et al., 2010). In 1986, the WHO further elaborated on this concept by introducing a classification of drugs of abuse, encompassing non-medical, self-administered psychoactive substances that affect perception, mood, consciousness, and behaviour (Andrés et al., 2002). Romaní (1999) conceptualizes a drug as a substance that modifies bodily functions, with its perception shaped by social and cultural norms, contextual factors, and intentionality, all of which are influenced by psychosocial variables. This integrative

perspective aligns with contemporary views of addiction as a complex, multidimensional construct and underscores the liminal status of substances such as *poppers*, which, although not legally recognized as drugs, are socially perceived as such (Vidal et al., 2022).

The main international drug control treaties—the Single Convention on Narcotic Drugs of 1961, the Convention on Psychotropic Substances of 1971, and the 1988 Convention against Illicit Traffic—do not mention *poppers* (United Nations Office on Drugs and Crime [UNODC], n.d.), leaving their distribution, sale, and use subject to national regulations. In Spain, according to BOE 274 of November 16, 1977, their sale is prohibited, although the law does not clarify whether their consumption is also restricted (Royal Decree 2829/1977, October 6, 1977), even though engaging in activities under their influence may involve risky situations (Fernández et al., 2022). This context confers an ambiguous and variable status on *poppers*, generating confusion in their classification and in the design of preventive strategies.

According to the Spanish National Plan on Drugs (Plan Nacional Sobre Drogas, 2022), *poppers* are composed of amyl, butyl, or isobutyl nitrites and are presented as a yellow/transparent liquid that evaporates upon exposure to air. Their volatility affects the mode of consumption, as the vapours are inhaled by placing the container under the nose (Ortíz et al., 2014). The name derives from the sound produced by the glass bottle when opened (Macher, 2010).

Their use induces vasodilation, relaxing the smooth muscles of the body (Energy Control, 2024) and facilitating penetration (Brouette & Raymond, 2001), which partly accounts for their prevalence among men who have sex with men (Romanelli et al., 2004). Medically, they are employed for cardiovascular conditions such as angina pectoris, acute coronary syndrome, and chronic heart failure (López et al., 2006). Recreational use, in contrast, is associated with euphoria, mild dizziness (Energy Control, 2024), and an intensification of pleasurable sensory experiences (Pereiro & Serrano, 2006). High doses or initial use may cause headaches, tachycardia, light-headedness, and fatigue (Energy Control, 2024). Concurrent use with other substances, such as cocaine or MDMA, increases the risk of myocardial infarction (Macher, 2010).

Poppers in Spain

In the two major national surveys on drug use conducted in Spain, *poppers* are classified under volatile inhalants grouped with other substances such as glues and solvents.

On one hand, the Survey on Alcohol and Other Drugs in Spain (EDADES, 2022), which focuses on the population aged 15 to 64 years, indicates relatively low usage. It reports that 0.9 % of this population has used *poppers* at least once in their lifetime, 0.2 % in the past 12 months, and 0.1 % in the past 30 days. On the other hand, the Survey on Drug Use in Secondary Education in Spain (ESTUDES, 2023), targeting students aged 14 to 18 years, shows that 2.8 % of this population have used them at least once in their lifetime, more than 2 % in the past 12 months, and less than 1 % in the past 30 days.

However, data collected by the Energy Control Observatory (OEC), which targets drug-using populations to generate knowledge on harm reduction and substance use (Fernández et al., 2024), stands in contrast to these findings.

Table 1. Substances used at least once in the past 12 months

	Men (n=851)	Women (n=529)		Total (n=1412)
Alcohol	802 (94,2%)	529 (95,7%)		1338 (94,8%)
Cannabis	736 (86,5%)	439 (79,4%)	χ2=12,383,p=,000	1182 (83,7%)
Cocaine	450 (52,9%)	281 (50,8%)		735 (52,1%)
MDMA	664 (78,0%)	468 (84,6%)	χ2=9,357, p=,002	1138 (80,6%)
Speed	381 (44,8%)	283 (51.2%)	χ2=5,516, p=,019	669 (47,4%)
Ketamine	276 (32,4%)	180 (32,5%)		458 (32,4%)
Mushrooms	206 (24,2%)	119 (21,5%)		328 (23,2%)
LSD	154 (18,1%)	96 (17,4%)		254 (18,0%)
Benzodiazepines without prescription	118 (13,9%)	78 (14,1%)		197 (14,0%)
Benzodiazepines with prescription	70 (8,2%)	77 (13,9%)	χ2=11,611, p=,001	147 (10,4%)
Methamphetamine	45 (5,3%)	32 (5,8%)		78 (5,5%)
GHB/GBL	75 (8,8%)	54 (9,8%)		131 (9,3%)
2C-B	181 (21,3%)	98 (17,7%)		281 (19,9%)
Mephedrone	36 (4,2%)	23 (4,2%)		60 (4,2%)
Poppers	427 (50,2%)	273 (49,4%)		704 (49,9%)
Nitrous oxide	71 (8,3%)	51 (9,2%)		123 (8,7%)
Chloroethane	138 (16,2%)	98 (17,7%)		237 (16,8%)
Tusibí	162 (19,0%)	121 (21,9%)		285 (20,2%)
Synthetic cannabinoids	38 (4,5%)	30 (5,4%)		70 (5,0%)

Source: own elaboration.

In 2022, the Observatory reported that 49.9 % of respondents had used *poppers* at least once in the past 12 months, with no significant differences between men and women (Vidal et al., 2022). This may reflect not only a growing prevalence of *poppers* use among young people in Spain, but also a more specific usage pattern within this group, highlighting the need for further study.

Objectives

General Objective

- To analyze the patterns of use, associated risks, and self-care strategies related to *poppers* among Spanish youth, including their diversification beyond sexualized contexts.

Specific Objectives

- To characterize *poppers* use, including frequency, amounts used, and consumption settings, among young people in Spain.
- To examine differences in use patterns and risk perceptions associated with *poppers* according to variables such as gender, age, and recreational context.
- To evaluate harm reduction strategies employed by individuals who use this substance.

MATERIALS AND METHODS

The research was conducted between January and December 2023, adopting a descriptive, cross-sectional, and ex post facto approach, with a mixed quantitative and qualitative design.

In the quantitative component, data were collected through a survey on sociodemographic characteristics, participation in leisure contexts, and drug use (past 12 months and new use within this period). The survey also examined *poppers* use over the past 12 months, new use within the same period, consumption settings, experienced effects, harm reduction strategies, acquisition methods, availability, concurrent substance use, and costs. The survey was designed using LimeSurvey, an online survey platform, and was disseminated via social media (Facebook, Instagram, Twitter, and TikTok), remaining active for one month.

A total of 3059 responses were obtained: 2124 men (69.4 %; mean age 30.5 years), 850 women (27.8 %; mean age 28.7 years), and 81 non-binary individuals (2.6 %; mean age 26.9 years). A further 0.1 % identified with another gender. In general, participants had completed their education and were either employed, studying, or combining both activities. The majority lived with family members or a partner without children, with employment as their primary source of income. Data were analysed using SPSS v.26, disaggregated by gender and classified into two age groups: 18–34 years and over 34 years. For the analysis of frequencies in the use of harm reduction strategies in *poppers* use, two categories were created following the approach of Vidal et al. (2016, 2022, 2023): low (never, rarely, sometimes) and high (almost always). Group differences were assessed using the chi-square test (categorical variables) and Student's t-test (continuous variables), with a significance threshold of 5 %.

In the qualitative component, semi-structured interviews and focus groups were conducted to explore beliefs and expectations regarding *poppers* use (Sanjuán, 2019). Participants were selected through snowball sampling, beginning with social media announcements and continuing via recommendations from initial participants. Data collection ceased upon reaching sample saturation (Hernández, 2014).

Four focus groups were organized:

- Madrid: 5 men (32, 34, 34, 28, 29 years old), 1 woman (28), and 1 trans woman (24).
- Barcelona: 1 man (25 years old), 2 women (19, 18), and 1 non-binary individual (29).
- Sevilla: 4 men (31, 31, 34, 50 years old), 1 woman (26), and 1 non-binary individual (24).

- Palma: 2 men (27, 29 years old) and 1 woman (29).

Additionally, 30 interviews were conducted:

- Madrid: 6 men (32, 36, 29, 20, 42, 24 years old), 3 women (35, 30, 25), and 1 non-binary individual (27).
- Palma: 3 men (32, 28, 21 years old) and 2 women (23, 27).
- Barcelona: 5 men (24, 29, 26, 30, 24 years old), 4 women (24, 34, 25, 28), and 1 non-binary individual (23).
- Sevilla: 1 man (22 years old) and 4 women (25, 25, 30, 27).

Each participant received an information sheet about the study and an informed consent form, which they were required to sign prior to participation. All sessions were audio-recorded and transcribed by independent personnel to ensure strict compliance with data protection regulations. Subsequently, participants were anonymized by assigning a code composed of technique type, city, gender, order, and age. Data were processed in ATLAS.ti, organized by age, gender, sex, and place of residence, and subjected to thematic content analysis.

RESULTS

A total of 90.4 % of respondents reported participating in electronic music events. Except for raves, which were predominantly attended by men, no significant gender differences were observed in other leisure settings. The main motivations for attending these spaces were entertainment, listening to music, and dancing. Less relevant motivations included engaging in sexual activity, finding a partner, or coping with negative emotions. For women, dancing was important, whereas substance use and seeking sexual encounters or partners were of lower relevance.

Regarding age, individuals aged 18–34 attended these spaces most frequently. Within this group, young women emphasized social motivations, such as meeting new people, and placed greater importance on escaping routine and exploring consciousness.

Drug Use and New Use in the Past 12 Months

On average, respondents reported using six psychoactive substances, with no statistically significant differences between men and women. Age-related variations were observed, with the 18–34 age group reporting the highest levels of consumption. This finding can be interpreted through the concept of *maturing out* (Prins, 2008), which posits that maturation influences patterns of use, choice of substances, access, use of information, and adoption of self-care strategies. The most frequently used substances were alcohol, MDMA, cannabis, cocaine, and *poppers*, highlighting the significance of the latter within this population.

These results, in line with Vidal et al. (2022), show that a significant proportion of the sample reported using multiple psychoactive substances in the past year. This suggests that, for an adequate understanding of this phenomenon in recreational contexts, it is essential to consider the simultaneity or combination of various psychosocial variables—such as interests, context, and age—rather than focusing solely on the type of substance consumed.

Table 2. Substances used (%) in the past twelve months (N = 3,059)

	Men (n = 2124)	Women (n = 850)		18-34 years (n = 2230)	+ 34 years (n = 829)		Total
Alcohol	2014 (94,8)	800 (94,1)		2129 (95,5)	763 (92,0)	p =,000	2892 (94,5)
Cannabis	1507 (71,0)	606 (71,3)		1756 (78,7)	430 (51,9)	p=,000	2186 (71,5)
Cocaine	1457 (68,6)	481 (56,6)	p=,000	1389 (62,3)	594 (71,7)	p = ,000	1983 (64,8)
MDMA	1740 (81,9)	733 (86,2)	p=,005	1941 (87,0)	606 (73,1)	p = ,000	2547 (83,3)
Speed	936 (44,1)	460 (54,1)	p=,000	1100 (49,3)	350 (42,2)	p = ,000	1450 (47,4)
Ketamine	675 (31,8)	287 (33,8)		802 (36,0)	197 (23,8)	p = ,000	999 (32,7)
Mushrooms	361 (17,0)	167 (19,6)		433 (19,4)	119 (14,4)	p = ,001	552 (18,0)
LSD	293 (13,8)	154 (18,1)	p=,003	365 (16,4)	102 (12,3)	p = ,005	467 (15,3)
Benzodiazepines without a prescription	246 (11,6)	103 (12,1)		310 (13,9)	58 (7,0)	p = ,000	369 (12,1)
Benzodiazepines with a prescription	183 (8,6)	142 (16,7)	p=,000	236 (10,6)	107 (12,9)		343 (11,2)
Methamphetamine	128 (6,0)	37 (4,4)		124 (5,6)	48 (5,8)		172 (5,6)
GHB/GBL	186 (8,8)	72 (8,5)		201 (9,0)	71 (8,6)		272 (8,9)
2C-B	309 (14,5)	121 (14,2)		363 (16,3)	84 (10,1)	p = ,000	447 (14,6)
Mephedrone	154 (7,3)	49 (5,8)		154 (6,9)	60 (7,2)		214 (7,0)
Poppers	1144 (53,9)	475 (55,9)		1411 (63,3)	262 (31,6)	p = ,000	1673 (54,7)
Nitrous oxide	109 (5,1)	42 (4,9)		139 (6,2)	13 (1,6)	p = ,000	152 (5,0)
Chloroethane	299 (14,1)	104 (12,2)		397 (17,8)	24 (2,9)	p = ,000	421 (13,8)
Tusibí	442 (20,8)	133 (15,6)	p=,001	483 (21,7)	116 (14,0)	p = ,000	599 (19,6)
Synthetic cannabinoids	121 (5,7)	45 (5,3)		136 (6,1)	35 (4,2)	p = ,045	171 (5,6)

Source: own elaboration.

> *"One day I take some, another day others… It's not just what I take, but how I take it. One day I snort, another I swallow… depending on whether I want a stronger effect, or if I am in a place where I cannot be seen… I couldn't say that I consume habitually… because all of this varies depending on the moment."* (Interview, Madrid, M, 1, 32 years old).

This quote not only confirms a pattern of polydrug use but also highlights that these practices are integrated into social and recreational dynamics. In this sense, it is more appropriate to refer to recreational polydrug use, as this term better reflects the diversity of substances, forms of consumption, doses, and motives associated with use behaviours in these contexts.

According to the survey, 54.7 % (n = 1673) had used *poppers* in the past 12 months. By gender, 53.9 % of men (n = 1144) and 55.9 % of women (n = 475) reported having used them. Regarding age, 63.3 % of users (n =

1411) belonged to the 18–34 age group, while only 31.6 % (n = 262) were over 34. Concerning substances tried for the first time in the past 12 months, *poppers* were the most frequently experimented with, at 22.3 % (n = 373). By gender, 22.5 % of men (n = 257) and 22.9 % of women (n = 109) reported first-time use. In terms of age groups, 23.4 % of individuals aged 18–34 (n = 330) had used them, compared to 16.4 % (n = 43) among those over 34.

These data suggest a shift in *poppers* use, with notable prevalence among the 18–34 age group and increasing use among both men and women. This reflects how group and social dynamics influence consumption decisions, adapting to new recreational environments.

Poppers: Contexts and Patterns

Poppers' use has gained relevance within the repertoire of substances consumed by the study population, characterized by its occasional nature and predominance in recreational events, although it is also used in private settings (table 3).

A total of 80.3 % obtain *poppers* through gifts or invitations, reflecting relatively easy availability. Forty-three percent of participants indicated that access is very easy. Regarding frequency of use, most respondents (65.2 %) combine *poppers* with other substances, with alcohol, cannabis, and MDMA being the most common. Consumption is concentrated in festivals (59 %), nightclubs (72.2 %), and raves (41.5 %). These data indicate an association between *poppers* use and group leisure, as well as a preference for combining them with other drugs.

This substance is consumed by inhaling vapours from the container, which may be used by a single person or shared. Typically, one or two inhalations are taken to maximize pulmonary expansion, using one or both nostrils and adjusting frequency, intensity, and duration according to the desired effects.

> *"You open the bottle, bring it close to your nose, and inhale depending on what you're looking for, how much you use… it will be stronger or weaker depending on the number of times you inhale."* (Interview, Madrid, W, 8, 30 years).

Another factor influencing the frequency and intensity of *poppers* use is the experience of adverse effects, with headaches being the most common.

> *"In a setting with few drugs, maybe I snort poppers 3–4 times all night. If there are many drugs, it can double. I also don't stay high all the time because then the headaches and other stuff come."* (Interview, Barcelona, W, 2, 29 years).

This effect influences dose modulation, number of inhalations, and consumption method, to minimize undesirable effects.

Among participants in this study, *poppers* use is primarily associated with leisure environments to facilitate social interaction.

> *"It creates moments with people you might not have talked to. The popper comes out, we inhale, and we're amazed, then keep dancing. It's something that helps promote interaction with those around you."* (Interview, Madrid, F, 3, 29 years).

Its use also enhances the effects of other substances, intensifying sensations and experiences. Combining *poppers* with other drugs is perceived to enhance enjoyment.

Table 3. Characteristics of *poppers* use (%) in the past 12 months (N = 1,673)

Location/Context	Men (n = 1144)	Women (n = 475)	p	18-34 years (n = 1411)	+ 34 years (n = 262)	p	Total
At home	363 (31,7)	106 (22,3)	,000	376 (26,6)	113 (43,1)	,000	489 (29,2)
Bars	300 (26,2)	105 (22,1)		366 (25,9)	54 (20,6)		420 (25,1)
Pubs	344 (30,1)	137 (28,8)		445 (31,5)	53 (20,2)		498 (29,8)
Raves	446 (39,0)	213 (44,8)	,029	643 (45,6)	52 (19,8)	,000	695 (41,5)
Festivals	682 (59,6)	277 (58,3)		866 (61,4)	121 (46,2)	,000	987 (59,0)
Nightclubs	835 (73,0)	331 (69,7)		1083 (76,8)	125 (47,7)	,000	1208 (72,2)
Friends' houses	538 (47,0)	193 (40,6)	,019	645 (45,7)	113 (43,1)		758 (45,3)
On the street	339 (29,6)	118 (24,8)		438 (31,0)	39 (14,9)	,000	477 (28,5)
Mixing *poppers* with other substances: n (%)							
Always	734 (64,2)	320 (67,4)		930 (65,9)	160 (61,1)		1090 (65,2)
Almost always	264 (23,1)	107 (22,5)		330 (23,4)	55 (21,0)		385 (23,0)
50% of the time	62 (5,4)	28 (5,9)		71 (5,0)	21 (8,0)		92 (5,5)
Rarely	57 (5,0)	15 (3,2)		56 (4,0)	17 (6,5)		73 (4,4)
Never	27 (2,4)	5 (1,1)		24 (1,7)	9 (3,4)		33 (2,0)
Substances mixed with poppers in the last 12 months: n (%)							
Alcohol	945 (82,6)	397 (83,6)		1192 (84,5)	194 (74,0)	,004	1386 (82,8)
Cannabis	406 (35,5)	167 (35,2)		539 (38,2)	59 (22,5)	,020	598 (35,7)
Cocaine	476 (41,6)	132 (27,8)	,000	506 (35,9)	116 (44,3)		622 (37,2)
MDMA	748 (65,4)	330 (69,5)		967 (68,5)	146 (55,7)		1113 (66,5)
Speed	295 (25,8)	170 (35,8)	,013	406 (28,8)	82 (31,3)		488 (29,2)
Ketamine	180 (15,7)	68 (14,3)		230 (16,3)	35 (13,4)		265 (15,8)
Mushrooms	15 (1,3)	7 (1,5)		21 (1,5)	3 (1,1)		24 (1,4)
LSD	35 (3,1)	15 (3,2)		44 (3,1)	8 (3,1)		52 (3,1)
Benzodiazepines without a prescript	16 (1,4)	6 (1,3)		23 (1,6)	2 (0,8)		25 (1,5)
Benzodiazepines with a prescription	13 (1,1)	8 (1,7)		18 (1,3)	6 (2,3)		24 (1,4)
Methamphetamine	34 (3,0)	8 (1,7)		31 (2,2)	13 (5,0)	,015	44 (2,6)
GHB/GBL	57 (5,0)	16 (3,4)		60 (4,3)	19 (7,3)		79 (4,7)
2C-B	80 (7,0)	26 (5,5)		102 (7,2)	8 (3,1)		110 (6,6)
Mephedrone	47 (4,1)	7 (1,5)		37 (2,6)	20 (7,6)	,024	57 (3,4)
Nitrous oxide	10 (0,9)	3 (0,6)		13 (0,9)	-		13 (0,8)
Chloroethane	83 (7,3)	25 (5,3)		108 (7,7)	6 (2,3)		114 (6,8)
Tusibí	113 (9,9)	22 (4,6)	,031	129 (9,1)	10 (3,8)	,007	139 (8,3)
Synthetic cannabinoids	10 (0,9)	3 (0,6)		12 (0,9)	2 (0,8)		14 (0,8)
Acquisition routes: n (%)							
Trusted contact (not friend)	167 (14,6)	44 (9,3)	,004	194 (13,7)	24 (9,2)	,043	218 (13,0)
Trusted contact (friend)	154 (13,5)	36 (7,6)	,001	183 (13,0)	13 (5,0)	,000	196 (11,7)
Purchase from a stranger	93 (8,1)	29 (6,1)		116 (8,2)	8 (3,1)	,003	124 (7,4)
Deep Web	10 (0,9)	-		6 (0,4)	4 (1,5)		10 (0,6)
Website	383 (33,5)	123 (25,9)	,003	437 (31,0)	81 (30,9)		518 (31,0)
Gift / Invitation	890 (77,8)	408 (85,9)	,000	1158 (82,1)	185 (70,6)	,000	1343 (80,3)
Perceived availability: n (%)							
Almost impossible	23 (2,0)	10 (2,1)		28 (2,0)	7 (2,7)		35 (2,1)
Difficult	167 (14,6)	61 (12,8)		184 (13,0)	53 (20,2)		237 (14,2)
Relatively easy	456 (39,9)	205 (43,2)		548 (38,8)	133 (50,8)		681 (40,7)
Very easy	498 (43,5)	199 (41,9)		651 (46,1)	69 (26,3)		720 (43,0)

Source: own elaboration.

> *"It complements… we start the night with a pill and wait for the high, right? Then a popper bottle appears, and that's when we consume. But usually, it's the second drug, never alone."* (Interview, Barcelona, W, 7, 34 years).

Some individuals report using *poppers* exclusively, without combining them with other drugs, although they generally have limited experience with the substance.

> *"I haven't been using poppers for long, and when I do, I don't take anything else. That way I don't get hooked."* (Interview, Palma, W, 5, 27 years).

Use is optimized through accumulated experience, both individual and collective, where self-awareness of the effects of *poppers* enriches the practice. Its incorporation into the broader consumption of psychoactive substances reflects an expanding social dynamic, particularly in recreational settings, highlighting how social interactions and group influences drive the adoption of new substances, framing its use as a flexible practice that adapts to diverse experiences.

Effects of Recreational *Poppers* Use

For this analysis, eight specialized websites were consulted: Psychonaut Wiki (2024), Energy Control (2024), ChemSafe (2024), Échele Cabeza (2024), Fundación de Ayuda contra la Drogadicción (2024), Drug Science, Alcohol and Drug Foundation (2024), and DanceSafe (2024). Thirty-six variables were extracted and assessed through the survey. The results reveal a diversity of both physical and psychological sensations.

The most frequently reported pleasurable effects were warmth (82.2 % of men, 78.5 % of women), an initial euphoric rush (72.5 % of men, 68.8 % of women), and increased intensity and duration of orgasm (15.8 % of men, 12.0 % of women). Regarding age, younger participants (18–34 years) reported a higher prevalence of rewarding sensations such as pleasant perceptual distortions (52.2 %) and pleasurable physical sensations (30.5 %), whereas those over 34 experienced fewer pleasurable effects (29.4 %).

The most frequently reported negative effects were related to the substance itself, including attention and coordination deficits, decreased reaction speed, blurred vision, dizziness, irritations on areas such as lips, cheeks, and nose, and fatigue once the effects subsided. Men reported a higher prevalence of a "high" sensation (74.3 %) compared to women (79.6 %), although this difference reversed for vertigo, affecting 15.8 % of women versus 13.4 % of men. Additionally, women experienced more skin irritations and nausea, while men reported more cases of nosebleeds and breathing difficulties.

Qualitative data indicate that among the pleasurable aspects of consumption, laughter and warmth stand out, while negative effects include nasal irritations and skin burns.

> *"It's great fun, laughter, warmth… In our group, several of us use it a lot, and sometimes we've noticed irritations in the nose and burns on our clothes where it has spilled."* (Interview, W, 4, Seville, 30 years).

Table 4. Effects/consequences associated with *poppers* use (%). (N = 1,673)

	Men (n = 1144)	Women (n = 475)	p	18-34 years (n = 1411)	+ 34 years (n = 262)	p	Total
Nosebleed	37 (3,2)	10 (2,1)		45 (3,2)	2 (0,8)	,029	47 (2,8)
Diarrhoea	37 (3,2)	23 (4,8)		54 (3,8)	7 (2,7)		61 (3,6)
Increased orgasm intensity/duration	181 (15,8)	57 (12,0)	,048	190 (13,5)	59 (22,5)	,000	249 (14,9)
Dizziness/exhaustion aftereffects	208 (18,2)	81 (17,1)		264 (18,7)	36 (13,7)		300 (17,9)
Increased sexual desire	330 (28,8)	98 (20,6)	,001	363 (25,7)	81 (30,9)		444 (26,5)
Increased aggressiveness	24 (2,1)	4 (0,8)		27 (1,9)	1 (0,4)		28 (1,7)
Pleasant perceptual distortions (tactile sensations, enhanced lights/ colors, etc.)	531 (46,4)	262 (55,2)	,001	736 (52,2)	95 (36,3)	,000	831 (49,7)
Initial high/euphoria	829 (72,5)	327 (68,8)		1027 (72,8)	170 (64,9)	,009	1197 (71,5)
Vertigo	153 (13,4)	75 (15,8)		210 (14,9)	26 (9,9)	,034	236 (14,1)
Falls	25 (2,2)	11 (2,3)		35 (2,5)	4 (1,5)		39 (2,3)
Nausea	75 (6,6)	42 (8,8)		115 (8,2)	8 (3,1)	,004	123 (7,4)
Reduced inhibitions	121 (10,6)	41 (8,6)		141 (10,0)	33 (12,6)		174 (10,4)
Reality distortion	246 (21,5)	117 (24,6)		333 (23,6)	44 (16,8)	,015	377 (22,5)
Lack of attention/coordination	238 (20,8)	122 (25,7)	,032	352 (24,9)	24 (9,2)	,000	376 (22,5)
Loss of consciousness	11 (1,0)	4 (0,8)		16 (1,1)	-		16 (1,0)
"High" feeling	850 (74,3)	378 (79,6)	,024	1097 (77,7)	173 (66,0)	,000	1270 (75,9)
Looping thoughts	43 (3,8)	14 (2,9)		50 (3,5)	7 (2,7)		57 (3,4)
Hallucinations	9 (0,8)	8 (1,7)		18 (1,3)	1 (0,4)		19 (1,1)
Paranoia	29 (2,5)	10 (2,1)		38 (2,7)	2 (0,8)		40 (2,4)
Distorted time perception	110 (9,6)	68 (14,3)	,006	172 (12,2)	15 (5,7)	,002	187 (11,2)
Pleasant physical sensations	334 (29,2)	154 (32,4)		431 (30,5)	77 (29,4)		508 (30,4)
Blurred vision	205 (17,9)	91 (19,2)		283 (20,1)	30 (11,5)	,001	313 (18,7)
Weakness	63 (5,5)	48 (10,1)	,001	100 (7,1)	12 (4,6)		112 (6,7)
Vomiting	15 (1,3)	11 (2,3)		26 (1,8)	1 (0,4)		27 (1,6)
Skin burns	128 (11,2)	35 (7,4)	,020	140 (9,9)	28 (10,7)		168 (10,0)
Irritations around lips, cheeks, nose	150 (13,1)	76 (16,0)		207 (14,7)	28 (10,7)		235 (14,0)
Skin/mucous redness	135 (11,8)	45 (9,5)		174 (12,3)	14 (5,3)	,001	188 (11,2)
Slowed reaction time	134 (11,7)	77 (16,2)	,014	197 (14,0)	22 (8,4)	,014	219 (13,1)
Tolerance	139 (12,2)	44 (9,3)		170 (12,0)	17 (6,5)	,009	187 (11,2)
Difficulty breathing	52 (4,5)	18 (3,8)		67 (4,7)	6 (2,3)		73 (4,4)
Speech difficulties	107 (9,4)	56 (11,8)		148 (10,5)	18 (6,9)		166 (9,9)
Cold/blue skin	24 (2,1)	7 (1,5)		22 (1,6)	10 (3,8)	,014	32 (1,9)
Feeling of well-being	457 (39,9)	215 (45,3)	,048	603 (42,7)	89 (34,0)	,008	692 (41,4)
Laughter	519 (45,4)	248 (52,2)	,012	698 (49,5)	101 (38,5)	,001	799 (47,8)
Seizures	2 (0,2)	1 (0,2)		4 (0,3)	-		4 (0,2)

Source: own elaboration.

In this context, shared experience plays a crucial role, as certain risks affect not only the individual but are observed and transmitted within the group.

> *"At a festival, my partner reacted badly. I told her to be careful… your head will hurt. I had been told that if you overdo it, it hurts. Although it's usually the other drugs, not the popper. But she went again and again… and seeing how badly it affected her and the pain she had, it taught her to control it."* (Interview, Barcelona, M, 1, 24 years).

This learning shapes how individuals adjust their consumption, establishing limits based on group dynamics and shared experiences. Thus, negative experiences not only modify individual decisions but, when shared, create collective norms regarding consumption, based on prior experiences that regulate future practices.

Those without negative experiences tend to minimize risks with general statements such as "it's nothing," "everyone does it," or "it doesn't cause long-term harm."

> *"I like that it lasts very little and is a very strong high… then it drops, and you're the same as at the start. Although if you do it repeatedly, I understand there are risks, but nothing has happened to me or my friends. I use it occasionally, at parties, and I don't think anything happens."* (Interview, Seville, M, 1, 22 years).

Consequently, *poppers* use is primarily perceived as an activity without significant negative consequences, which reduces harm perception, increases the sense of harmlessness, and fosters normalization, dissociating negative effects from the substance itself and attributing them to other drugs.

Risk Management and Safety Practices in Recreational *Poppers* Use

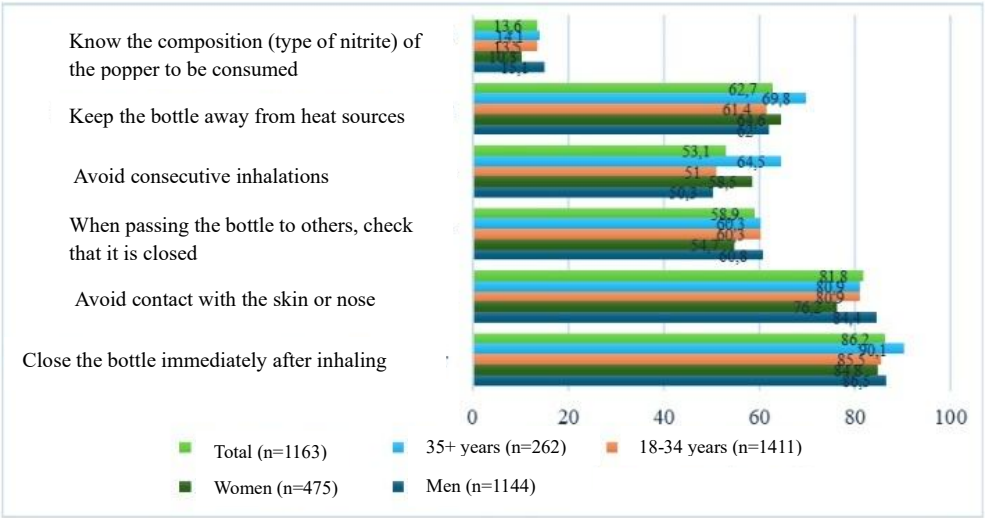
This section explores the phenomenon based on the categories proposed by Feltmann et al. (2021), adapting them to the observed reality according to the contributions of the websites. Participants were asked about the frequency of strategies used to reduce the risk of burns and irritations from contact (closing the bottle, avoiding skin contact, checking that it is closed when passing it), measures taken to prevent headaches (avoiding rapid successive inhalations), actions to prevent combustion of the liquid (keeping it away from heat sources), and the importance of knowing the composition of *poppers* (figure 1).

The most frequently mentioned strategies were closing the bottle after inhaling and avoiding direct contact with the skin, while the least frequent was knowing the composition. Men adopted more care strategies than women, and younger participants (18–34) implemented them more frequently than those over 34, suggesting variations in risk perception and preventive practices according to these variables.

Qualitative data identified specific strategies to prevent headaches, episodes of depression, and burns, including avoiding skin contact, controlling consumption intensity, and adjusting use according to the level of intoxication.

> *"I try not to bring it too close to my nose. Sometimes it has spilled on my clothes or skin, and it burns a lot. [...] But not much more… If I am very drunk, the popper multiplies the sensation by 100, so by the end of the night,*

Figure 1. Chart of risk reduction strategies in poppers use ("% high frequency")



Source: own elaboration.

it overwhelms me and sends me home. I also try not to inhale too strongly, spacing out the inhalations, as I've been told." (Interview, Seville, W, 4, 30 years).

These strategies are applied considering learned or experienced risks, demonstrating how risk/pleasure is constructed from external information and personal experience.

Consumption sometimes involves sharing, which varies depending on the environment and constitutes a risk. In open and crowded spaces, the bottle is usually handled only by the person initiating its use, whereas in closed spaces with fewer people, it is passed carefully. To prevent burns and spills, the thumb is used as a barrier between the bottle and the nostril.

"If it spills on you, it hurts. Twice it has spilled on me and touched my skin, but for some reason it didn't burn me. This is part of the risk and taking more or less care. I see it as something relatively harmless, when I know it isn't really, because nothing bad has happened to me. I haven't been burned, nothing has happened, I don't know anyone addicted… That's why I don't see risks and don't take much care!" (Interview, Palma, M, 4, 23 years).

The informant describes their perception of risk related to handling the bottles, based on personal experience, which leads them to adopt or omit certain care strategies. This situation contributes to *poppers* being perceived as a low-risk substance despite the dangerous episodes mentioned. Consequently, participants did not report any harm in the days following use, and care strategies were implemented only during the act of consumption.

DISCUSSION

This study aimed to explore consumption patterns, risks, and self-care strategies associated with the use of *poppers* among Spanish youth, as well as their integration into recreational contexts. This analysis allowed for the identification of key and novel aspects regarding the expansion of its use in these settings. The results complement and extend previous findings from studies such as Van Dyck et al. (2023) and Vidal et al. (2022), which highlighted the importance of context in the adoption of new substances. The transition of *poppers* into recreational spaces reinforces Zinberg's (1984) theory on the interaction between drug, individual, and environment, emphasizing the influence of group dynamics in normalizing consumption. Additionally, the data show similarities with studies on polydrug use in electronic music settings (Pepper et al., 2024), highlighting specific characteristics of *poppers*, such as their brief and immediate effects, which differentiate them from other more prevalent substances like MDMA or cocaine.

Although *poppers* use in the general population is considered low according to national macro-surveys, the high prevalence reported in this study (54.7 % in the past 12 months) suggests a significant discrepancy between population-level data and recreationally specific use, underscoring the importance of designing sampling methodologies that are more sensitive to particular populations to obtain an accurate representation of the phenomenon.

One of the most relevant findings was the growing integration of *poppers* into recreational polydrug use dynamics. This phenomenon reflects not only a change in the contexts of use but also the adaptability of consumption practices within leisure subcultures. Moreover, participants demonstrated a low level of risk perception, facilitating the incorporation of this substance into recreational events, particularly in combination with other drugs.

Regarding self-care, practices to mitigate adverse effects such as headaches and burns were identified, suggesting an increasing awareness of harm reduction. However, other aspects—such as knowledge of product composition, the perceived safety of *poppers* use, and lack of information about associated risks—remain a challenge in the field of prevention.

Given that the study relied on a convenience sample, there may be selection bias due to the lack of randomization and the overrepresentation of individuals who use drugs in electronic music contexts. Therefore, the findings are not generalizable to the entire population of drug users. Nevertheless, the study provides a valuable perspective on *poppers* use in party environments and contributes significantly to harm and risk reduction, proposing new interventions in this area.

CONCLUSIONS

The findings indicate that, although *poppers* use is generally low, its prevalence is increasing in specific populations, particularly in recreational settings. Moreover, its use has diversified, shifting from habitual consumption associated with communities of men who have sex with men to becoming a common substance in leisure environments. Features that make *poppers* attractive include their immediate and short-lived effects, the

perception of low risk due to the absence of a hangover, and ease of use. These characteristics contribute both to their growing popularity and to their inclusion in recreational polydrug use dynamics.

Although users have begun to implement harm reduction strategies, such as promptly closing the bottle, avoiding direct skin contact, and verifying the chemical composition of the product, these practices remain uncommon. This behaviour suggests a lack of information regarding the risks associated with *poppers* consumption, especially when used in combination with other substances. These findings highlight the importance of continuing research on *poppers* use and its interaction with other substances, to inform future interventions that consider gender- and age-related differences.

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