ADICCIONES

ISSN / 0214-4840
E-ISSN / 2604-6334



PUBLISHED BY:
SOCIDROGALCOHOL
Sociedad Científica Española de Estudios sobre el Alcohol, el Alcoholismo y las otras Toxicomanías

FUNDED BY:
MINISTERIO DE SANIDAD
SECRETARÍA DE ESTADO DE SANIDAD
DELEGACIÓN DEL GOBIERNO PARA EL PLAN NACIONAL SOBRE DROGAS

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ISSN: 0214-4840 ■ **E-ISSN:** 2604-6334 ■ **SVPF:** 89010R ■ **LEGAL DEP.:** V-1543-1989

INDEXED IN: SOCIAL SCIENCES CITATION INDEX (SSCI-JCR), SCIENCE CITATION INDEX EXPANDED (SCIE-JCR), EMBASE, SCOPUS, MEDLINE, PSICODOC, PSYCINFO, IBECS, ÍNDICE CSIC, LATINDEX, REDALYC, INDEX COPERNICUS, PROQUEST, DIALNET, GOOGLE SCHOLAR, WEB OF SCIENCE (WOS).

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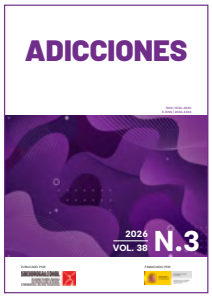
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ADICCIONES
2026 ■ VOL. 38 ■ N. 3 ■ PAGES 151–154
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EDITORIAL

Undermining cross-sectional studies undermines public health research

Desacreditar los estudios transversales debilita la investigación en salud pública

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A cross-sectional study is an observational study in which data are collected from a population at a single point in time, including people who may or may not be affected by the outcome or event of interest. Although data are collected only once, the variables may refer to past events, current circumstances, or future intentions. For example, in addiction research participants may report the age at which they started smoking, their current smoking status, their intention to smoke in the future, or retrospective information about parental smoking or alcohol consumption during childhood (Aonso-Diego et al., 2024). Data are typically collected using standardized questionnaires or surveys, although cross-sectional studies may also rely on secondary data sources, including electronic health records, administrative databases, disease registries, or other routinely collected datasets (Puspa Zuleika & Legiran, 2022). Despite their important role in identifying population-level problems and exploring associations between behavioural and health-related factors, which are particularly relevant in the field of addictions, cross-sectional studies are increasingly dismissed in epidemiological publishing, often due to concerns regarding their limited ability to establish causal relationships. This can be explained by the tendency of such critiques to conflate the inherent limitations of the design with shortcomings in its implementation, while ignoring that the scientific value of cross-sectional research depends primarily on the clarity of the research question and the rigor of its execution (Bono & McNamara, 2011; Dávila-Mendoza & López-Ortiz, 2025). Scientific publishing has become a central pillar of the modern academic system, engaging not only researchers and academic staff but

■ ISSN: 0214-4840 / E-ISSN: 2604-6334

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also students and a broader audience beyond traditional academic circles. The steady rise in scientific publishing has led to a surge in submissions, causing journals to adopt either more restrictive editorial policies or, in some cases, more permissive approaches driven by economic incentives.

In this context, initial editorial decisions, particularly whether a manuscript is sent for peer review, have become critically important. One main reason for rejection at this early stage is the cross-sectional nature of the study (Bono & McNamara, 2011; Dávila-Mendoza & López-Ortiz, 2025). In fact, several journals have implemented explicit policies that exclude cross-sectional studies from consideration for publication. A study published in a medical journal reported that 98.7% of rejected manuscripts were observational reports, of which 138 (92.6%) were cross-sectional studies (Dávila-Mendoza & López-Ortiz, 2025). This tendency is also reflected in peer-review practices. For example, in a study examining the association between hospital tobacco control policies and smoking among healthcare workers across 60 hospitals and more than 10,000 participants, a reviewer acknowledged that "the large dataset is a key selling point," while simultaneously stating that "the cross-sectional nature of the study is a key limitation." In another case, a population-based study including over 8,000 adolescents, representing more than 65% of the adolescent population in each territory, was criticized as being "non-scientific" due to its cross-sectional design and the inclusion of multiple variables in the questionnaire, despite the analyses being guided by a clear conceptual framework. These examples reflect a deeply rooted epistemological hierarchy in the teaching of epidemiology and research methodology, where study designs are primarily assessed on the basis of their capacity for causal inference, control of the independent variable, and sample selection. Within this hierarchy, experimental designs are considered the highest, followed by longitudinal studies, with cross-sectional designs ranked lower (Bosque-Prous & Espelt, 2022; Portell & Vives, 2024).

Focusing exclusively on causal inference, that is, on the methods used to establish cause–effect relationships, can obscure the concept of causality itself, understood as how processes actually operate in the real world (Muntaner, 2013). Approaches that reduce causation to statistical associations risk overlooking key elements such as underlying mechanisms, system dynamics, context, and stability. As a result, findings may function as "black-box" relationships that identify casual-associations but offer limited explanatory power or guidance for effective interventions (Muntaner & Dunn, 2019). For example, the well-documented social gradient in health in longitudinal studies shows that relying only on statistical methods is not enough to fully understand why health inequalities occur. These patterns are shaped by broader social and structural factors that are not always captured by standard analytical approaches. In addition, one of the most widely used frameworks for assessing causality relies on comparing what happened with what would have happened under different circumstances. However, these alternative scenarios cannot be directly observed or empirically tested within a single study design. For this reason, and as discussed below, traditional approaches that prioritize certain methods for causal inference should not be considered the only, or the highest, standard for evaluating causal relationships (Muntaner & Dunn, 2019).

It is widely stated and commonly accepted that causal relationships cannot be inferred from cross-sectional studies, as they do not allow for the establishment of temporal order between variables, which is considered one of their main limitations. For this reason, most cross-sectional studies aim to describe individual or contextual health determinants and to evaluate associations between outcome (dependent) and exposure (independent) variables, rather than to establish causal relationships (Kesmodel, 2018; Puspa Zuleika & Legiran, 2022). However, this limitation should be interpreted with caution. In many cases, well-formulated research questions and appropriately designed measures can support a plausible temporal order, even within a cross-sectional design. For instance, analyses of age at first use of a substance in relation to subsequent dependence allow for a logical (and cautious) temporal interpretation. Similarly, it is conceptually well established that the link between parental educational level and children's dietary patterns or children's substance use has a temporal direction based on cross-sectional data. Therefore, it is not automatically true that longitudinal and experimental studies are inherently better suited for establishing causal relationships. Moreover, the external validity of experimental and longitudinal studies may be influenced by factors such as loss to follow-up, restrictive inclusion criteria, incomplete data, and non-representative samples (Szklo & Nieto, 2012). Finally, it should be noted that study designs considered to have greater capacity for causal inference are often defined, in part, by their ability to manipulate the independent variable, an option that is not available in observational studies (Deaton & Cartwright, 2018). However, this criterion should not be interpreted as an inherent indicator of higher methodological quality. In many cases, the inability to manipulate the independent variable reflects ethical or practical constraints rather than limitations of the study design itself. Moreover, experimental studies are frequently conducted under highly controlled conditions, which may limit the external validity of their findings in real-world settings. For these reasons, the core issue is not the study design itself but whether the chosen design is appropriate for the research question and carried out with methodological rigour.

Importantly, negative perceptions of cross-sectional research are often reinforced by the dissemination of

methodologically weak studies. This may be partly explained by the fact that the relative simplicity and lower cost of cross-sectional designs, while important strengths, can also represent potential weaknesses. If not carefully designed, this ease of implementation may lead to misuse and, ultimately, to the devaluation of the design. Common issues include analyses based on insufficient sample sizes, inadequate population coverage when representativeness is required, and limited statistical precision and power. More critically, a significant proportion of cross-sectional studies provide little additional knowledge by replicating well-established associations without addressing unresolved questions, improving measurement, expanding populations, or offering new conceptual insights. Such redundancy adds limited scientific value and may be misattributed to flaws in the design itself rather than to deficiencies in study justification, originality, or analytical strategy (Spector, 2019).

As with other study designs, though arguably with greater emphasis due to its frequently undervalued status, high-quality cross-sectional research requires not only robust, well-implemented sampling strategies and validated data collection methods aligned with the study objectives, but also their clear and thorough documentation, along with a well-articulated analytical framework, including causal diagrams (Shahar & Shahar, 2013). When these conditions are met, cross-sectional studies are highly valuable for describing the distribution of health-related phenomena, plausible causal and non-causal association, including potential confounders. In this sense, due to their simplicity and parsimony, and because they are easier to communicate to the public and monitor over time, they represent a fundamental tool for public health research, planning, and decision-making (Gibson, 2010). Dismissing cross-sectional studies also entails neglecting the assessment of the magnitude and distribution of health conditions and behaviours, particularly across axes of social inequality (Espelt et al., 2016; Muntaner, 2019). This, in turn, distances research from external validity and from a more comprehensive understanding of population health. Given that all study designs have inherent limitations, critical appraisal should focus on study design and implementation, rather than on design labels.

When appropriately designed and implemented, cross-sectional studies do not undermine the scientific method; rather, they strengthen its capacity to generate meaningful and policy-relevant evidence.

Conflict of interest

The authors declare no competing interests. Albert Espelt is an Editor of Adicciones. He was not involved in the editorial process or in the decision-making regarding the review and acceptance of this manuscript.

Artificial intelligence (AI)

We used an AI tool to assist with improving the English language and clarity of the manuscript. We carefully reviewed all AI-generated suggestions and incorporated changes where appropriate. We remain fully responsible for the final content of the manuscript.

Funding

The research is partly supported by the Ministry of Universities and Research, Government of Catalonia (grant number: 2021SGR00906) and Plan Nacional Sobre Drogas 2025|079.

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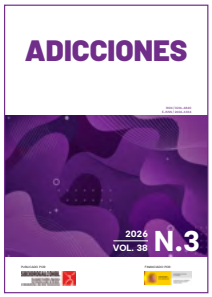
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ADICCIONES
2026 ■ VOL. 38 ■ N. 3 ■ PAGES 155–164
www.adicciones.es



ORIGINAL

Caregivers under pressure: Burden, coping strategies, and alcohol consumption

Cuidadores bajo presión: Sobrecarga, estrategias de afrontamiento y consumo de alcohol

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Abstract

The high physical, emotional, and social demands of caring for a person with cancer can lead to elevated levels of burden among family caregivers, negatively impacting their mental health and self-care behaviors. In this context, some caregivers may respond to the challenges and emotional distress of caregiving by adopting coping styles that involve risky behaviors, such as alcohol consumption. *Objective:* To determine the relationship between caregiver burden, coping styles, and alcohol use among caregivers of individuals with cancer. *Method:* Descriptive and correlational study with a sample of 172 primary caregivers**.** *Results:* Alcohol consumption showed a positive and significant correlation with the level of caregiver burden (rs = .160, p = .027), and a negative correlation with emotion-focused coping (rs = −.190, p = .013) and dysfunctional coping (rs = −.206, p = .007). *Conclusion:* Alcohol consumption in caregivers is associates with high leves of burden. There is a need for culturally sensitive interventions that promote healthy coping strategies and prevent risk behaviors, especially in Latin American family contexts where social and emotional bonds are often mediated through alcohol-related rituals.

Keywords: caregivers, caregiver burden, coping skills, alcohol drinking, health risk behaviors, neoplasms

Resumen

Las altas exigencias físicas, emocionles y sociales de cuidar a una persona con cáncer puede inducir altos niveles de sobrecarga en los cuidadores familiares, repercutiendo en la salud mental y en las conductas de autocuidado. En este sentido, pueden haber cuidadores que ante la dificultad de cuidar y el sufrimiento adoptan algunos estilos de afrontamiento que implican conductas de riesgo como el consumo de alcohol. *Objetivo:* Determinar la relación entre el nivel de sobrecarga del cuidador, los estilos de afrontamiento y el consumo de alcohol en cuidadores de personas con cáncer. *Método.* Estudio descriptivo y correlacional, con una muestra de 172 cuidadores principales. *Resultados.* El consumo de alcohol mostró una correlación positiva y significativa con el nivel de sobrecarga (rs=,160, p=,027) y una correlación negativa con los estilos de afrontamiento centrado en la emoción (rs= -,190, p=,013) y disfuncional (rs= -,206, p=,007). *Conclusión.* El consumo de alcohol en cuidadores se asocia con altos niveles de sobrecarga. Se requieren intervenciones de afrontamiento saludable que prevengan conductas de riesgo con enfoque cultural al contexto familiar latinoamericano en donde los rituales de tejido social y afectivo están mediados por el consumo de alcohol.

Palabras clave: cuidadores, carga del cuidador, habilidades de afrontamiento, consumo de bebidas alcohólicas, conductas de riesgo para la salud, consumo de alcohol, neoplasias

■ *Received: October 2025; Accepted: April 2026.*

■ ISSN: 0214-4840 / E-ISSN: 2604-6334

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Cancer remains one of the leading global public health challenges. In 2020, approximately 20 million new cases and 10 million deaths were reported worldwide, and these figures are expected to rise steadily over the coming decades (Pan American Health Organization [PAHO], 2022). Although advances in cancer treatment have substantially improved survival, they have also shifted a considerable proportion of patient care to the home setting, where family caregivers assume complex responsibilities encompassing physical, emotional, social, and spiritual support (Sánchez Ramírez & Silva Espín, 2024).

Evidence consistently shows that assuming the caregiving role is associated with substantial caregiver burden, reflected in emotional distress, physical health deterioration, financial strain, impaired quality of life, and changes in health-related behaviours (Albrecht et al., 2022; Johnston et al., 2024; Sánchez Ramírez & Silva Espín, 2024; Son et al., 2023; Soriano et al., 2022). Systematic reviews in oncology have further demonstrated that caregiver burden is associated with greater psychological distress, unmet supportive care needs, and poorer overall well-being (Molassiotis & Wang, 2022; Thana et al., 2021). Female sex, being the patient's spouse or adult child, providing care for longer periods, financial difficulties, limited psychosocial support, and dysfunctional family functioning have all been consistently associated with higher levels of caregiver burden (Sánchez Ramírez & Silva Espín, 2024).

Although oncology research has extensively documented the emotional consequences of caregiving, considerably less attention has been paid to the health-risk behaviours adopted by caregivers in response to chronic stress. Kent et al. (2016) highlighted the need to broaden research on caregivers' health behaviours, including alcohol consumption, given its potential impact on both caregivers' health and the quality of care they provide.

Studies involving caregivers of individuals with cancer indicate that a meaningful proportion experience problematic alcohol consumption and that this behaviour is associated with greater caregiver burden. In a multicentre study conducted in the United Kingdom, 8% of caregivers screened positive on the Alcohol Use Disorders Identification Test (AUDIT), and those reporting problematic alcohol consumption exhibited significantly higher caregiver burden scores (Webber et al., 2020). However, these studies did not examine the combined interplay between caregiver burden and coping strategies.

Research on caregiving more broadly provides additional explanatory evidence. Rospenda et al. (2010) found that social and emotional dimensions of caregiver burden—rather than objective physical caregiving demands—were associated with problematic alcohol consumption. These findings suggest that the subjective experience of stress, particularly relational and emotional strain, may trigger coping responses involving alcohol use. Consistent with this interpretation, more recent studies indicate that dysfunctional coping strategies, such as avoidance and emotional dysregulation, increase the likelihood of hazardous alcohol consumption among caregivers facing high emotional demands (Hernández-Chilatra et al., 2024).

During periods of crisis, such as the COVID-19 pandemic, increased substance use was observed among caregivers as a coping mechanism, particularly in the presence of insomnia, anxiety, and depression (Varma et al., 2024). These findings further support the hypothesis that alcohol consumption may represent a behavioural response to sustained caregiver burden.

Evidence also indicates that morbidity among family caregivers increases as caregiver burden intensifies, adversely affecting both emotional and physical well-being while increasing the likelihood of adopting or maintaining unhealthy behaviours, including alcohol consumption (Kassem et al., 2022). Within the oncology setting, Webber et al. (2020) reported that higher caregiver burden scores were significantly associated with greater frequency and severity of alcohol consumption, suggesting that prolonged caregiver burden may act as a precipitating or exacerbating factor for problematic alcohol use.

Despite these findings, several important knowledge gaps remain. First, oncology research has primarily focused on outcomes such as depression, quality of life, and social support, while rarely examining caregiver burden, coping strategies, and alcohol consumption within the same analytical framework. Second, although evidence from Europe and North America is increasing, studies conducted in Latin American populations remain scarce, despite the fact that alcohol consumption may be culturally embedded as a means of social interaction and emotional regulation. Third, correlational studies examining these relationships are limited, restricting the development of evidence-based hypotheses to inform preventive interventions.

Accordingly, the present study aimed to examine the relationship between caregiver burden, coping strategies, and alcohol consumption among family caregivers of individuals with cancer. Based on previous evidence, we hypothesised that higher levels of caregiver burden would be associated with greater alcohol consumption; that dysfunctional coping strategies would be positively associated with alcohol consumption; and that the combination of high caregiver burden and dysfunctional coping strategies would be associated with an increased likelihood of problematic alcohol consumption.

Methods

Study design and participants

This descriptive correlational study included family caregivers of individuals diagnosed with any type of

cancer in the state of Chihuahua, Mexico. A systematic probability sampling strategy with a sampling interval of $k = 3$ was employed. The sampling frame comprised potential caregivers identified in the waiting areas of secondary- and tertiary-level public healthcare institutions during the data collection period. Eligible caregivers were consecutively listed according to the chronological order in which they were identified and met the inclusion criteria (Polit & Beck, 2017). A random starting point was selected, after which one out of every three eligible caregivers was invited to participate until the target sample size of 172 participants was reached.

Eligibility criteria included being the primary family caregiver of a person diagnosed with cancer, being aged 18 years or older, and providing unpaid care.

Voluntary participation was considered an additional ethical requirement and did not replace the eligibility criteria. Only caregivers who met all inclusion criteria were invited to participate. Those who agreed to participate provided written informed consent before enrolment. Individuals who did not meet the eligibility criteria, declined participation, or returned questionnaires with missing data were excluded from the study.

Intruments

Sociodemographic and caregiving characteristics were assessed using the Caregiver–Person with Chronic Disease Characterisation Form (GCPC-UN-D) (Chaparro et al., 2014). This instrument comprises 42 items organised into three domains: characteristics of the caregiver–care recipient dyad, including the sociodemographic profile; perceived burden and support; and information and communication resources available to the dyad. The questionnaire contains separate sections for the patient and the caregiver; however, only the caregiver section was administered in the present study. This section includes 11 items assessing personal and sociodemographic characteristics, including sex, age, years of education, place of origin, place of residence, marital status, occupation, socioeconomic status, whether the caregiver had been providing care since the patient's diagnosis, and religious affiliation. An additional item assessing current alcohol consumption (yes, no, or occasionally) was incorporated for the purposes of this study.

Caregiver burden was assessed using the Zarit Burden Interview (ZBI) (Marín et al., 1996), which consists of 22 items rated on a five-point Likert scale ranging from 1 (*never*) to 5 (*almost always*). Total scores range from 22 to 110, with higher scores indicating greater caregiver burden. Scores are interpreted as follows: ≤46, no caregiver burden; 47–55, mild caregiver burden; and ≥56, severe caregiver burden. The instrument has previously demonstrated good reliability among informal primary caregivers of children with chronic degenerative diseases in Mexico (Cronbach's $\alpha = .84$) (Pardo et al., 2014) and has also been used with primary caregivers of patients with cancer (Valencia et al., 2017). In the present study, Cronbach's alpha was .90.

Coping strategies were measured using the Brief COPE (Coping Orientation to Problems Experienced Inventory) (Carver, 1997), a 28-item instrument comprising 14 subscales: self-distraction, active coping, denial, substance use, emotional support, instrumental support, behavioural disengagement, venting, positive reframing, planning, humour, acceptance, religion, and self-blame. Responses are rated on a four-point Likert scale ranging from 0 (never) to 3 (always), indicating the frequency with which respondents engage in each behaviour or thought. The instrument yields three higher-order coping dimensions: problem-focused coping, emotion-focused coping, and dysfunctional coping.

The Brief COPE has been widely used to assess coping strategies among caregivers of patients with advanced cancer (Álvarez Pérez & Parra Rodríguez, 2019), as well as caregiving ability, caregiver burden, stress, and coping among family caregivers of individuals undergoing cancer treatment (Coppetti et al., 2019), and coping strategies and social support among caregivers of patients with cancer (Long et al., 2020). Previous studies have reported excellent internal consistency (Cronbach's $\alpha = .93$). In the present study, Cronbach's alpha was .78.

Alcohol consumption was assessed using the Alcohol Use Disorders Identification Test (AUDIT) (Babor et al., 2001), a 10-item questionnaire scored on a five-point Likert scale (0–4), with total scores ranging from 0 to 40; higher scores indicate greater alcohol consumption. The recommended cut-off scores were applied: 0–7, low-risk drinking or abstinence; 8–15, hazardous drinking; 16–19, harmful drinking; and ≥20, probable alcohol dependence. The AUDIT has been validated in the Mexican population, demonstrating good internal consistency (Cronbach's $\alpha = .81$) (Villamil et al., 2009). In the present study, Cronbach's alpha was .89.

Procedure and ethical considerations

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Nursing at the Autonomous University of Nuevo León, Mexico (approval number FAEN-D-1761). Authorisation was also obtained from the administrative authorities of the participating cancer care institutions in the city of Chihuahua. Data were collected between February and May 2022 in the waiting areas of secondary- and tertiary-level public healthcare institutions.

Before participation, all eligible caregivers received information regarding the study objectives, their rights as research participants, and their right to withdraw from the study at any time without consequences. Written informed consent was obtained from all participants prior to data collection. The study was conducted in accordance with

the ethical principles established in the Regulation of the Mexican General Health Law on Health Research (Secretaría de Salud, 1987).

Data analysis

Data were analysed using IBM SPSS Statistics for Windows, Version 21.0. Descriptive statistics included frequencies, percentages, measures of central tendency, and measures of dispersion. The Kolmogorov–Smirnov test with Lilliefors correction indicated that the data did not meet the assumption of normality; therefore, non-parametric statistical tests were used. Differences according to alcohol consumption were examined using the Mann–Whitney *U* test. Associations among the study variables were analysed using Spearman's rank-order correlation coefficient.

Results

Sociodemographic characteristics of family caregivers of individuals with cancer

The sample consisted predominantly of female caregivers (73.3%), with a mean age of 39 years (SD = 12.8). Nearly half were married (47.1%), while 32.0% were single. Regarding employment status, 63.4% were employed, 20.9% were homemakers, and 11.6% were self-employed. Most caregivers identified as Catholic (85.5%). The most common relationships to the person with cancer were son or daughter (37.2%), mother (19.2%), and sibling (16.9%).

The average duration of caregiving was 12.5 months (SD = 14.2), with caregivers providing a mean of 9.7 hours of care per day (SD = 8.17). Most care recipients were women (75%) aged over 50 years. The most frequent cancer diagnoses were breast cancer (38%), cervical cancer (13%), prostate cancer (8%), and stomach cancer (7%). The most common caregiver–patient relationships involved mothers (24%), daughters (23%), and sisters (10%), and caregiving had generally been provided since the time of diagnosis, with caregiving duration ranging from one to seven years.

Caregiver burden, coping strategies, and alcohol consumption

According to the established cut-off scores of the Zarit Burden Interview, 75% of caregivers experienced severe caregiver burden, whereas the remaining 25% reported mild caregiver burden. The highest-scoring burden items reflected caregivers' perceptions that they could provide better care for their family member (29.1%), lacked sufficient financial resources to provide care (17.4%), feared for the future of their relative (17.4%), perceived that their social life had been adversely affected (16.9%), and wished they could leave caregiving responsibilities to someone else (15.1%).

Overall, caregivers showed the highest scores for problem-focused coping (mean = 50.8, SD = 21.1), followed by emotion-focused coping (mean = 46.7, SD = 17.5), whereas dysfunctional coping showed the lowest mean score (mean = 39.0, SD = 36.1).

Regarding problem-focused coping, 45.3% of caregivers reported taking action to improve the situation, 37.2% focused their efforts on addressing the problem directly, 36.6% attempted to develop a strategy to manage the situation, and 34.9% carefully considered the steps they should take.

For emotion-focused coping, 29.7% reported trying to find something positive in the experience, and a similar proportion indicated that they had learned to live with the situation. In addition, 27.3% sought guidance or advice, while 21.5% received emotional support from others.

Regarding dysfunctional coping, 33.7% reported distracting themselves through work or other activities, 30.2% openly expressed negative emotions, 28.5% attempted to avoid the situation through entertainment (e.g., watching television or films), and 21.5% reported engaging in self-criticism. Furthermore, 22.1% reported using alcohol or other drugs to feel better, whereas 17.4% reported doing so specifically to cope with the caregiving situation.

With respect to alcohol consumption, 36% of caregivers reported current alcohol use (95% CI [29, 43]). According to the AUDIT classification, 32% (95% CI [25, 39]) were classified as engaging in hazardous alcohol consumption, 16% (95% CI [10, 21]) as harmful alcohol consumption, and 22% (95% CI [15, 28]) met the criterion for probable alcohol dependence. Regarding the number of alcoholic drinks consumed on a typical drinking day, 20.0% reported consuming one or two drinks, 32.3% reported three to four drinks, 23.1% reported five to six drinks, and 24.7% reported consuming seven or more drinks.

Comparison of caregiver burden and coping strategies according to alcohol consumption

The Mann–Whitney U test revealed statistically significant differences between caregivers who reported current alcohol consumption and those who did not. Specifically, caregivers who consumed alcohol exhibited higher levels of caregiver burden and greater use of emotion-focused and dysfunctional coping strategies than non-drinkers (Table 1).

Correlations between caregiver burden, coping strategies, and alcohol consumption

Spearman's rank-order correlation analyses (Table 2) showed a positive and statistically significant association between caregiver burden and alcohol consumption, as measured by the total Alcohol Use Disorders Identification Test (AUDIT) score (rs=.168, p = .027), indicating that higher levels of caregiver burden were associated with greater alcohol consumption.

Table 1
Comparison of median caregiver burden and coping strategy scores by current alcohol consumption (Mann–Whitney U test)

Variable	Alcohol consumption	*n*	x̄=	*Mdn*	*SD*	*U*	*P value*
Caregiver burden	No	110	62.05	61.00	9.88	2736.0	.031
	Yes	62	65.08	63.00	9.04		
Problem-focused coping	No	110	53.88	52.77	18.91	2749.0	.034
	Yes	62	45.51	44.44	23.86		
Emotion-focused coping	No	110	49.72	50.00	15.62	2594.0	.009
	Yes	62	41.55	38.33	19.70		
Dysfunctional coping	No	110	41.01	38.88	12.73	2551.0	.006
	Yes	62	35.48	33.33	13.21		

Note. $\bar{x}$= mean. Mdn= median. DE = Standard deviation, U= U de Mann Whitney. p= significancia, n=sample size.

Table 2
Spearman correlation matrix for caregiver burden. coping strategies. and alcohol consumption (AUDIT)

Variable	Alcohol consumption	*P value*
Caregiver burden	r_s=.168*	.027
Problem-focused coping	r_s =-.130	.090
Emotion-focused coping	r_s =-.190*	.013
Dysfunctional coping	r_s =-.206*	.007

Note. *p ≤ .05 indicates statistical significance. r_s= Spearman's rank correlation coefficient.

In contrast, statistically significant negative correlations were observed between alcohol consumption and both emotion-focused coping (rs= -.190, p = .013) and dysfunctional coping (rs= −.206, p = .007). These findings indicate that higher scores on emotion-focused and dysfunctional coping were associated with lower AUDIT scores in this sample of caregivers.

Discussion

The present study aimed to determine the relationship between caregiver burden, coping strategies, and alcohol consumption among family caregivers of individuals with cancer. The findings showed that a high proportion of caregivers experienced severe caregiver burden and that current alcohol consumption was common in this population, with a substantial proportion classified as engaging in hazardous, harmful, or dependent alcohol use. Consistent with the proposed hypothesis, a positive association was identified between higher levels of caregiver burden and greater alcohol consumption. In addition, significant differences were observed in caregiver burden levels and in the use of specific coping strategies between caregivers who consumed alcohol and those who did not. Taken together, these findings suggest that alcohol consumption may be associated with the subjective experience of caregiver burden and the coping strategies adopted by caregivers, providing preliminary empirical evidence on this triad within the oncology setting.

In the present sample, caregivers were predominantly women, most of whom were married and either employed or engaged in homemaking, and who provided care for prolonged periods exceeding eight hours per day. This profile is consistent with the well-established characterization of informal caregivers in oncology, where women and close family members—particularly daughters, mothers, and spouses—assume most caregiving responsibilities and experience higher levels of emotional burden (Sánchez Ramírez & Silva Espín, 2024). International evidence likewise confirms that being female, being a spouse or close relative, and combining paid employment with caregiving responsibilities are associated with greater caregiver burden and increased psychological distress (Chavarri Guerra et al., 2022; Combita & Chaparro, 2021; Ignat et al., 2025; Son et al., 2023). Collectively, these structural factors reinforce the greater vulnerability of female caregivers to the strain associated with the caregiving role.

One of the factors associated with caregiver burden is the number of hours devoted to caregiving. In the present sample, caregivers reported providing an average of 9.7 hours of care per day, equivalent to approximately 68 hours per week. This level of caregiving intensity represents sustained exposure to physical and emotional demands that may contribute to cumulative burden. Care demands become particularly intense when cancer treatment requires hospitalization or frequent outpatient visits, as caregivers must continuously monitor symptoms, accompany patients to specialized medical appointments, and actively participate in treatment and rehabilitation processes (Semere et al., 2021).

The findings of the present study indicate that more than half of the caregivers experienced severe caregiver

burden. This may be explained by the considerable physical and psychological demands associated with caring for a person with cancer, as well as by the uncertainty surrounding the disease, which may contribute to feelings of hopelessness (Guan et al., 2021). These findings are consistent with previous studies reporting severe caregiver burden syndrome among caregivers of older adults with advanced cancer, with potentially adverse consequences for both physical and mental health (Faronbi, 2018; Soriano et al., 2022).

Regarding the relationship between caregiver burden and coping, Faronbi (2018) reported that caregiver burden was associated with different coping styles, including problem-focused, emotion-focused, and dysfunctional coping, supporting the notion that increasing caregiving demands may activate both adaptive and maladaptive coping responses. In the present study, problem-focused coping was the predominant coping style, followed by emotion-focused coping and, to a lesser extent, dysfunctional coping, a pattern that is consistent with previous research. However, when examining the relationship between coping strategies and alcohol consumption, a negative association was observed between emotion-focused coping, dysfunctional coping, and AUDIT scores. These findings suggest that, in this sample, greater use of these coping styles was not necessarily associated with higher alcohol consumption. This observation is consistent with the findings of Bravo Bravo and Zuloaga Castellanos (2019), who reported that substance use was among the least frequently reported coping strategies used by caregivers. These divergent findings highlight the need for further research examining the relationships among the variables comprising this triad, as current evidence remains inconclusive.

Alcohol consumption is commonly classified as a dysfunctional coping strategy; however, this category encompasses a broader range of avoidant or maladaptive responses that do not necessarily involve substance use (Long et al., 2020). Therefore, dysfunctional coping should not be considered synonymous with alcohol consumption, but rather understood as a broader repertoire of behavioural responses to stress. In addition, social and cultural factors may influence the ways in which caregivers manage caregiver burden and their likelihood of resorting to substance use. The availability of social support networks may also moderate these behaviours. In contexts of greater emotional vulnerability, the coexistence of, or shift toward, the use of other substances, such as tobacco, cannabis, or opioids, has also been documented, underscoring the need for a comprehensive approach to risk assessment and intervention (Varma et al., 2024).

Therefore, the finding that caregivers who rely on emotion-focused coping do not necessarily exhibit problematic alcohol consumption suggests that caregivers also manage caregiver burden through other adaptive strategies, such as behavioural disengagement, denial, self-distraction, self-blame, and venting. Although these strategies do not necessarily involve substance use, they may still have a negative impact on caregivers' psychological well-being. In this regard, Huertas et al. (2021) found that caregivers tend to adopt maladaptive and dysfunctional coping strategies characterized by reduced social support seeking and decreased participation in recreational or leisure activities, which may further contribute to social isolation and emotional burden.

Although not all caregivers developed alcohol dependence, the evidence suggests that stress associated with the caregiving role may increase vulnerability to alcohol use as a coping strategy. Kassem et al. (2022) reported relatively low prevalence rates of alcohol use disorder among caregivers; however, more recent studies have shown that, in contexts of high emotional demand, such as the COVID-19 pandemic, nearly 20% of caregivers initiated or increased substance use as a means of coping with stress (Varma et al., 2024). Similarly, Rospenda et al. (2010) and Hernández-Chilatra et al. (2024) found that high levels of emotional burden and difficulties in emotional regulation were associated with a greater likelihood of hazardous alcohol consumption, which may, in turn, affect the caregiver–patient relationship (Ignat et al., 2025). Taken together, these findings support the need to integrate alcohol use screening and the promotion of adaptive coping strategies into caregiver support programmes.

According to the findings of the present study, a positive and statistically significant relationship was identified between caregiver burden syndrome and alcohol consumption: higher levels of caregiver burden were associated with greater alcohol consumption. Specifically, 38% of caregivers reported current alcohol consumption, of whom 22% showed signs of alcohol dependence and 16% were classified as engaging in harmful alcohol consumption. These findings indicate that alcohol consumption is not only present among family caregivers but is also directly associated with higher levels of emotional and physical burden derived from the caregiving role.

This relationship is consistent with the findings reported by Webber et al. (2020), who observed that caregiver burden scores were significantly higher among caregivers with alcohol use disorders, reinforcing the hypothesis that alcohol consumption may function as a dysfunctional coping strategy in response to the prolonged strain associated with caregiving.

It is important to note that, although a positive association was observed between caregiver burden and alcohol consumption, this finding primarily indicates that both phenomena coexist to a significant extent within this sample of caregivers. Given the cross-sectional and correlational design of the present study, these findings do not allow conclusions regarding directionality or causality.

Rather, the observed relationship should be understood as part of a broader network of individual and contextual factors influencing the caregiving experience. In Latin American settings, where caregiving is often regarded as a family responsibility and alcohol consumption forms part of socially accepted practices, these cultural frameworks may influence how caregivers manage caregiver burden.

These considerations should therefore be interpreted as hypotheses that require confirmation through longitudinal or more robust analytical studies. As noted by Murillo-Rojas (2021), alcohol consumption has historically been linked to rituals, celebrations, and shared social experiences, even in contexts of social crisis or the loss of cultural reference points. The author argues that the absence of protective environments and the normalization of alcohol consumption in family gatherings may facilitate both the initiation and maintenance of psychoactive substance use. Furthermore, by conceptualizing the family as a system in which roles, emotional bonds, and norms interact, family culture may either legitimize or discourage certain behaviours, including alcohol consumption. Within this framework, alcohol use among caregivers may be influenced not only by the emotional burden associated with the caregiving role but also by a cultural structure in which alcohol forms part of the social and emotional fabric, particularly during celebrations, bereavement, and shared family routines.

These findings underscore the need to develop intervention strategies that recognize the role of culture in caregivers' alcohol consumption patterns, where such patterns exist and have an impact on their quality of life. Understanding the symbolic, emotional, and relational dimensions of alcohol use within the family system is essential. Mental health interventions targeting caregivers should incorporate culturally appropriate approaches that not only promote healthy coping strategies but also address culturally normalized practices in a respectful manner.

The present findings provide an initial contribution to understanding alcohol consumption among family caregivers of individuals with cancer. In this sample, caregiver burden was positively associated with the severity of alcohol consumption, suggesting that both phenomena coexist in a substantial proportion of caregivers. In addition, differences were observed in coping strategies and the severity of alcohol consumption, although these did not follow a consistent linear pattern. Given the descriptive and correlational nature of the study, these findings do not establish directionality; however, they do highlight the importance of incorporating alcohol use screening and caregiver burden assessment into caregiver support programmes. Strengthening adaptive coping strategies and providing timely psychosocial support may contribute to addressing both the emotional and behavioural dimensions of caregiving in the context of chronic illness.

Implications

Among the practical implications of the present findings is the need to recognize alcohol consumption as a potential risk factor within caregiver support programmes and care policies, particularly in family settings where the caregiving role is characterized by high levels of emotional burden. Although the findings do not allow definitive conclusions to be drawn, they highlight an important avenue for future research regarding the cultural factors associated with alcohol consumption, particularly in relation to the grieving processes experienced by both caregivers and care recipients. This symbolic dimension of alcohol consumption has received limited attention in the scientific literature, underscoring the need for further research exploring these relationships from a culturally contextualized perspective. It is also important to emphasize that the findings obtained from this sample cannot be generalized to other populations and should be regarded as an initial contribution that warrants validation and replication in future studies, particularly within the Latin American context.

Limitations

This study has several limitations that should be considered when interpreting the findings. In particular, the use of self-administered instruments may have affected the accuracy of participants' responses because of potential social desirability bias, recall bias, or self-perception bias, which may have influenced the estimation of both alcohol consumption and caregiver burden.

Furthermore, the cross-sectional design limits the ability to establish causal relationships between the variables under investigation, allowing only the identification of statistical associations at the time of assessment. These limitations should be taken into account when considering the applicability of the findings to other settings or populations.

Future studies should employ longitudinal designs and incorporate multiple sources of information to strengthen the validity of the findings.

Conclusions

The findings indicate that most caregivers experienced severe caregiver burden and that 36% reported current alcohol consumption. Regarding coping strategies, problem-focused coping was the predominant coping style, followed by emotion-focused coping. Consistent with the study objective, higher levels of caregiver burden were associated with greater alcohol consumption, whereas greater use of emotion-focused and dysfunctional coping strategies was associated with lower severity of alcohol consumption.

These findings provide relevant evidence to inform the development of preventive interventions aimed at reducing

caregiver burden and facilitating the timely identification and management of alcohol consumption among family caregivers. They also underscore the need for a better understanding of the dysfunctional coping strategies used by primary caregivers of individuals with cancer as part of a complex response to the emotional burden associated with caregiving.

Conflict of Interest

The authors declare that they have no conflicts of interest.

Author Contributions

MVB: Conceptualization, formal analysis, methodology, project administration, resources, writing—original draft.
LCHD: Supervision, writing—review and editing.
FRGF: Conceptualization, methodology, supervision.

Declaration

All original ideas presented in this manuscript are the authors' own. Generative Artificial Intelligence (AI) (ChatGPT-4 Plus) was used solely to assist in improving the wording and translating the abstract. The authors take full responsibility for the content of the manuscript.

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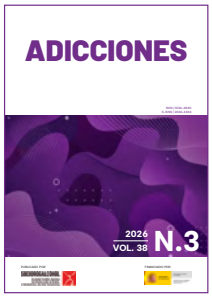
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ADICCIONES
2026 ■ VOL. 38 ■ N. 3 ■ PAGES 165–174
www.adicciones.es



ORIGINAL

Premature mortality recorded with mention of substance use disorders in Spain according to death records: Sex- and substance-specific differences

Mortalidad prematura registrada por trastornos por uso de sustancias en España según registros de defunción: Diferencias por sexo y tipo de sustancia

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Abstract

Substance use disorders (SUDs) are a significant cause of premature death, although their impact is often underestimated when only the number of deaths is considered. This study used three premature mortality indicators—Potential Years of Life Lost (PYLL), mean PYLL per death (mPYLL), and life expectancy at death (LE)—to quantify premature mortality with documented mention of substance use disorders on death certificates and to analyze differences by sex and substance type in Spain between 2016 and 2020. A retrospective observational study was conducted using national mortality records from the Spanish National Statistics Institute, including deaths in which an ICD-10 code corresponding to substance use disorders (F10–F19) appeared anywhere on the death certificate. Premature mortality was estimated using PYLL, which represent the years of life not lived relative to an age limit, and mPYLL and LE were also calculated, stratified by sex and substance type. A total of 13,772 deaths with mention of substance use disorders (75.1% in men), accounting for 184,158 PYLL, with a mean of 17.3 years lost per death. Illegal drugs and polydrug use showed higher mPYLL and lower LE values, whereas alcohol and tobacco accounted for a higher overall burden but at older ages. LE was 66.6 years, lower than that of the general population. The findings describe a high burden of premature mortality recorded with mention of substance use disorders, with distinct patterns by sex and substance. The use of indicators such as potential years of life lost may help strengthen epidemiological surveillance and inform prevention and care strategies.

Keywords: substance use disorders, premature mortality, potential years of life lost, life expectancy, sex differences, Spain

Resumen

Los trastornos por uso de sustancias (TUS) son una causa relevante de muerte prematura, aunque su impacto suele subestimarse cuando se valora solo el número de defunciones. Este estudio empleó tres indicadores de mortalidad prematura —Años Potenciales de Vida Perdidos (APVP), promedio de APVP por defunción (APVPM) y esperanza de vida al fallecimiento (EV)— para cuantificar la mortalidad prematura registrada con mención de TUS en los certificados de defunción y analizar las diferencias por sexo y tipo de sustancia en España entre 2016 y 2020. Se realizó un estudio observacional retrospectivo utilizando los registros nacionales de mortalidad del Instituto Nacional de Estadística, incluyendo las defunciones en las que figuró, en cualquier posición del certificado, algún código CIE-10 correspondiente a TUS (F10–F19). La mortalidad prematura se estimó mediante los APVP, que expresan los años de vida no vividos respecto a una edad límite, y se calcularon también el APVPM y la EV, estratificados por sexo y tipo de sustancia. Se registraron 13.772 defunciones con mención de TUS (75,1% en hombres), que concentraron 184.158 APVP, con una media de 17,3 años perdidos por fallecimiento. Las drogas ilegales y el policonsumo presentaron valores más elevados de APVPM y menor EV, mientras que alcohol y tabaco concentraron una carga mayor, aunque a edades más avanzadas. La EV fue de 66,6 años, inferior a la población general. Los resultados describen una elevada carga de mortalidad prematura en defunciones con mención de TUS y patrones diferenciados por sexo y sustancia. El uso de indicadores como los APVP puede ser útil para complementar la vigilancia epidemiológica y orientar la planificación preventiva y asistencial.

Palabras clave: trastornos por uso de sustancias, mortalidad prematura, años potenciales de vida perdidos, esperanza de vida, diferencias de sexo, España

■ *Received: November 2025; Accepted: May 2026.*

■ ISSN: 0214-4840 / E-ISSN: 2604-6334

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Substance use disorders (SUDs) constitute a public health problem with major social, health, and economic repercussions, in addition to a clear increase in morbidity and mortality (World Health Organization [WHO], 2024). The harmful use of alcohol, tobacco, and other drugs is associated both with direct deaths from poisoning or medical complications and with an increased risk of injuries, violent behavior, and chronic non-communicable diseases (Degenhardt et al., 2018; WHO, 2021).

Globally, the United Nations Office on Drugs and Crime (UNODC) estimates that 296 million people used drugs in 2021, equivalent to 5.8% of the global population. Cannabis is the most widely used substance, followed by amphetamines and cocaine (UNODC, 2023). For its part, the World Health Organization estimates that alcohol is responsible for about 3 million deaths per year (5.3% of the total), while tobacco causes more than 8 million deaths each year, including more than one million non-smokers exposed to second-hand smoke (WHO, 2021; WHO, 2024).

In Europe, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) recorded 6,392 overdose deaths in the European Union in 2022, compared with 6,166 in 2021. Opioids were present in approximately 74% of these cases, although an increase in deaths linked to cocaine use and polydrug use is also observed, especially among people aged 40 to 59 years (EMCDDA, 2024).

In Spain, an estimated 38.9% of the adult population has used some psychoactive substance in their lifetime (EMCDDA, 2024). According to the Spanish Observatory on Drugs and Addictions (OEDA), in 2022 there were 800 overdose deaths and more than 3,000 alcohol-related deaths. Likewise, 25% of deaths in traffic accidents occurred under the influence of drugs. In this context, alcohol and tobacco remain the substances with the greatest impact in terms of consumption and mortality, while cocaine continues to be the most widespread illegal drug (OEDA, 2023).

Beyond figures on substance use and overall mortality, it is essential to assess the impact of SUDs in terms of premature mortality. People with SUDs have a higher risk of dying at younger ages compared with the general population (Kim et al., 2025; Yukhnenko et al., 2023). Globally, SUDs are estimated to cause around 128,000 deaths and more than 18 million healthy years of life lost each year (Global Burden of Disease Collaborative Network [GBD], 2024; UNODC, 2023). This excess mortality is attributed to overdoses, infections, cardiovascular and respiratory complications, suicide, and other consequences arising from risk behaviors (Rehm et al., 2017).

In this regard, although international studies have highlighted the impact of SUDs on premature mortality (Kim et al., 2025; Svensson et al., 2022), evidence in Spain remains scarce and, for the most part, predates 2016. The available studies have focused on estimating prevalence or overall mortality figures, or on analyzing specific substances and geographical settings (De la Fuente et al., 2014; Fierro et al., 2010; Guitart et al., 2011; Marí-Dell'Olmo et al., 2015). Moreover, there are hardly any analyses examining differences by sex and type of substance, despite the fact that the international literature consistently shows that patterns of use and their consequences differ markedly between men and women (EMCDDA, 2024; WHO, 2024).

In light of the above, this study analyzes premature mortality recorded with mention of SUDs on death certificates in Spain during the period 2016–2020. To this end, specific indicators—Potential Years of Life Lost (PYLL), mean PYLL (mPYLL), and Life Expectancy (LE)—stratified by sex and type of substance are used. The aim is to provide evidence on the magnitude and characteristics of this recorded mortality, with potential usefulness for epidemiological surveillance and public health planning.

Method

A retrospective observational study was conducted based on the records of deaths occurring in Spain between 2016 and 2020, provided by the National Statistics Institute (INE). This period was selected because it corresponded to the most recent data available with complete and homogeneous information at the time of the analysis, and because it allowed more stable estimates of the premature mortality indicators using a multi-year interval.

All deaths were included in which, among the 42 causes of death coded in each record, a diagnosis corresponding to mental and behavioral disorders due to psychoactive substance use appeared, according to the International Classification of Diseases, 10th Revision (ICD-10) (WHO, 1992), specifically codes F10-F19. This group comprises disorders related to alcohol (F10), opioids (F11), cannabinoids (F12), sedatives and hypnotics (F13), cocaine (F14), other stimulants (F15), hallucinogens (F16), tobacco (F17), volatile solvents (F18), and polydrug use or other substances (F19). This approach includes both the underlying cause of death and the contributing causes recorded on the certificate, which enables more cases to be captured, although it introduces heterogeneity in the attribution of the cause of death.

The choice of codes F10–F19 responded to a criterion of specificity, with the aim of identifying deaths in which SUDs were explicitly recorded on death certificates. This approach avoids inferring their presence from potentially related causes in which the disorder cannot be confirmed, although it does not include all deaths attributable to substance use. Therefore, the results should be interpreted as mortality recorded with explicit mention of SUDs on death certificates, and not as total mortality attributable to substance use.

The variables analyzed were sex, age, and type of substance. Premature mortality was quantified using three indicators: Potential Years of Life Lost (PYLL)—years of life not lived relative to an age limit, which reflect the overall loss due to early deaths; mean PYLL per death (mPYLL)—the mean number of years lost per death; and Life Expectancy (LE)—the average age that a person could reach according to the observed mortality rates. For the calculation of PYLL, the age interval was set between 1 and 79 years, following the methodological criteria of the INE (National Institute of Statistics, Spain), which defines the indicator for this range with the aim of estimating premature mortality and ensuring comparability between causes of death. The use of the same interval also made it possible to calculate the indicators homogeneously for the set of major causes of death included in the analysis (INE, 2024).

PYLL and mPYLL were calculated by applying the classical formulas for these indicators (Gardner & Sanborn, 1990). This procedure consists of subtracting the age at death from the predefined age limit (79 years) and then summing all the differences. This approach makes it possible to estimate both the total and the mean potential years of life lost, providing a sensitive measure of the real impact of premature mortality. LE was estimated using the Sullivan method, an indirect procedure widely used in public health that combines age-specific mortality rates with the population structure in life tables. This method offers a summary measure of life expectancy adjusted to the actual distribution of mortality, providing a more precise view of the effect of SUDs on the average length of life in the affected population (Sullivan, 1971).

The indicators were calculated after stratification by sex and type of substance. In addition, they were compared with those corresponding to the 17 major causes of death defined by the INE for the same period (INE, 2024), which made it possible to situate the burden of premature mortality recorded with mention of SUDs in relation to the other causes of death at the national level. The analysis was designed with a descriptive approach aimed at characterizing the values observed in the national death records.

Given that the present study analyzed the entire set of national death records with mention of substance use disorders in Spain during the period 2016–2020, the results should be interpreted as descriptions of an exhaustive population-based register and not as estimates derived from a sample. Consistent with the descriptive aim of the study, no statistical inference tests were applied, nor were confidence intervals calculated or between-group statistical tests performed, since the analysis was aimed at describing the observed values of PYLL, mPYLL, and LE in that register, rather than at extrapolating sample results to a population.

The statistical analysis was performed with the Epidat 4.2 software (Consellería de Sanidade, Organización Panamericana de la Salud, & Universidad CES de Colombia, 2016).

Results

Between 2016 and 2020, 13,772 deaths with mention of SUDs (F10–F19) were recorded in Spain, equivalent to an average annual rate of 5.9 deaths per 100,000 inhabitants. Mortality predominantly affected men (75.1%), compared with women (24.9%). The mean age at death was 65.9 years (SD: 13.6), with a median of 67 years and an interquartile range of 18 years, as shown in Table 1.

Regarding the distribution by type of substance, tobacco (51.8%) and alcohol (43.5%) accounted for the majority of deaths, while polydrug use and other substances represented 3.3% of the total. The remaining substances showed a marginal weight (<1% each), although with notable gender differences: for opioids, women represented 39.8% of deaths, a higher proportion than for alcohol (29.0%) or tobacco (21.8%).

Table 2 presents the premature mortality indicators in Spain during the period 2016–2020, broken down by sex. In total, 184,158 PYLL were accumulated, representing a mean of 17.3 years lost per death. Men accounted for most of this burden, with 148,356 PYLL and an mPYLL of 17.0 years, whereas in women 35,802 PYLL and an mPYLL of 17.6 years were recorded. These results show that, in the period analyzed, although men accumulate a higher absolute number of years lost, the observed mPYLL value was higher in women. LE at death in people with SUDs was 66.6 years, with no relevant differences found by sex.

As shown in Figure 1, LE in the Spanish population as a whole during the period 2016–2020 was 83.1 years, compared with 66.6 years in those who died from SUDs, representing a difference of 16.5 years. This gap was maintained when disaggregating by sex: in men, the difference was 13.8 years (80.3 versus 66.5), while in women it reached 19 years (85.7 versus 66.7).

After analyzing the overall differences by sex, the distribution of premature mortality according to the type of substance used was explored (Table 3). Tobacco and alcohol accounted for the largest absolute burden of years lost, with 95,049 and 89,575 PYLL, respectively, followed at a great distance by polydrug use/other substances (11,877 PYLL), opioids (1,538 PYLL), cocaine (1,372 PYLL), and sedatives and hypnotics (496 PYLL).

When comparing by sex, men systematically accumulated most of the burden, with male/female PYLL ratios ranging from 1.8 for sedatives and hypnotics to 5.8 for polydrug use. For alcohol and tobacco, the ratios were 2.3 and 3.4, respectively, whereas among other substances, the highest values were observed for opioids (2.7) and cocaine (3.5).

Table 1
General characteristics of deaths due to substance use disorders in Spain, 2016–2020

Descriptive statistics			
Statistic	**Total**	**Men**	**Women**
Total number of deaths	13,772	10,338 (75.1%)	3,434 (24.9%)
Mean (years)	65.94	65.93	65.97
Standard deviation (years)	13.63	14.83	13.33
Median (years)	67	66	67
Interquartile range (years)	18	18	19
Distribution by substance			
Statistic	**Total**	**Men**	**Women**
Alcohol (F10)	5,997 (43.5%)	4,260 (71.0%)	1,737 (29.0%)
Opioids (F11)	103 (0.8%)	62 (60.2%)	41 (39.8%)
Cannabis (F12)	3	2	1
Sedatives and hypnotics (F13)	33 (0.2%)	17 (51.5%)	16 (48.5%)
Cocaine (F14)	47 (0.3%)	36 (76.6%)	11 (23.4%)
Hallucinogens (F16)	1	1	0
Tobacco (F17)	7,130 (51.8%)	5,578 (78.2%)	1,552 (21.8%)
Polydrug use / other substances (F19)	458 (3.3%)	382 (83.4%)	76 (16.6%)

Note. Codes F15 (other stimulants) and F18 (volatile solvents) recorded no deaths in the period analyzed. Categories with very few cases (cannabis and hallucinogens) are presented for completeness, although their relative weight is marginal.
Source. INE. Authors' own elaboration, 2025.

Table 2
Premature mortality indicators for substance use disorders in Spain, 2016–2020, by sex

Year	PYLL			mPYLL			LE		
	Men	**Women**	**Total**	**Men**	**Women**	**Total**	**Men**	**Women**	**Total**
2016	29,607	11,188	40,795	19.8	18.7	19.44	63.8	67.1	64.8
2017	28,580	5,720	34,300	16.6	17.8	16.8	67.2	66.2	67.0
2018	28,668	5,736	34,403	16.6	17.8	16.8	67.4	65.6	67.1
2019	27,549	5,977	33,526	16.2	16.8	16.3	67.3	67.3	67.3
2020	33,953	7,182	41,134	16.4	16.4	16.4	66.7	66.6	66.7
Total	**148,356**	**35,802**	**184,158**	**17.0**	**17.6**	**17.3**	**66.5**	**66.7**	**66.6**

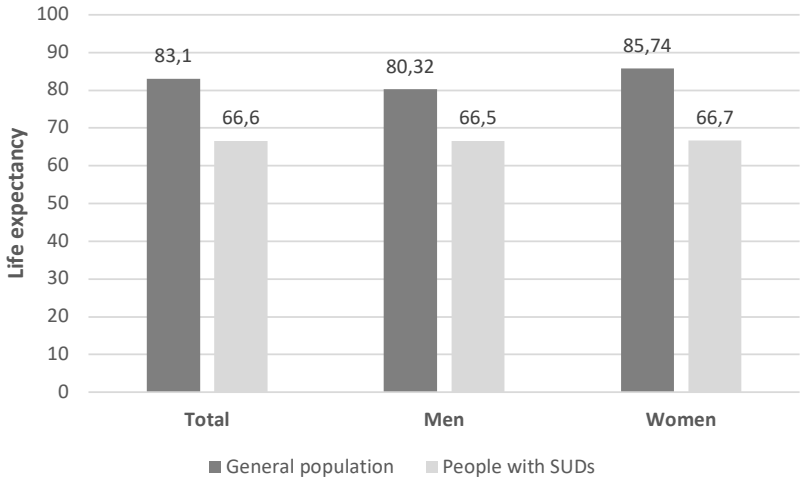
Note. PYLL = Potential Years of Life Lost; mPYLL = mean Potential Years of Life Lost per death; LE = Life Expectancy.
Source. INE. Authors' own elaboration, 2025.

Table 3
Premature mortality indicators for substance use disorders in Spain, 2016–2020, by type of substance

Substance used	PYLL			Male/female PYLL ratio	mPYLL			LE
	Men	**Women**	**Total**		**Men**	**Women**	**Total**	
Alcohol (F10)	62,225	27,350	89,575	2.3	16.6	18.8	17.2	65.8
Opioids (F11)	1,126	412	1,538	2.7	22.1	17.2	20.5	67.2
Sedatives and hypnotics (F13)	320	176	496	1.8	29.1	17.6	23.6	68.0
Cocaine (F14)	1,067	305	1,372	3.5	29.6	30.5	29.8	51.5
Tobacco (F17)	73,399	21,650	95,049	3.4	16.2	16.7	16.3	67.7
Polydrug use / other substances (F19)	10,125	1,752	11,877	5.8	27.4	26.6	27.3	54.6

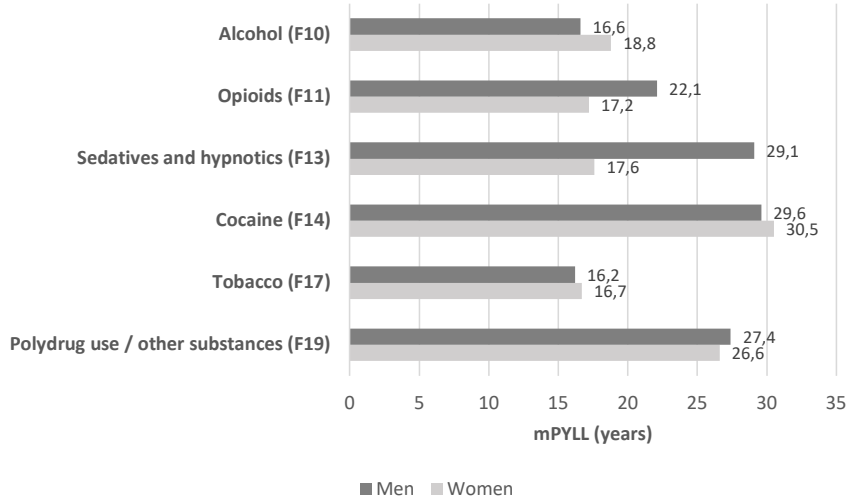
Note 1. Categories with a very small number of cases (cannabis, other stimulants, hallucinogens, and volatile solvents) are not shown in the table due to their small relative weight (<0.05% of PYLL).
Note 2. PYLL = Potential Years of Life Lost; mPYLL = mean Potential Years of Life Lost per death; LE = Life Expectancy.
Source. INE. Authors' own elaboration, 2025.

Figure 1
Life expectancy at death in the general population and in people with substance use disorders in Spain, 2016–2020, total and by sex



Source. INE. Authors' own elaboration, 2025.

Figure 2
Mean Potential Years of Life Lost per death (mPYLL) by type of substance and sex in Spain, 2016–2020



Source. INE. Authors' own elaboration, 2025.

However, the observed mPYLL value was higher in women for alcohol, cocaine, and tobacco. The distribution of mPYLL by type of substance and sex is presented visually in Figure 2.

Regarding LE at death, variations were observed depending on the substance: the lowest values were found for cocaine (51.5 years) and polysubstance use (54.6 years), whereas tobacco and alcohol recorded 67.7 years and 65.8 years, respectively.

The premature mortality figures obtained were compared with the 17 major causes of mortality in Spain during the study period (Table 4). In absolute terms, SUDs accumulated 184,158 PYLL, ranking below causes such as external causes (1,253,736 PYLL), neoplasms (4,745,281 PYLL), or diseases of the circulatory system (2,079,010 PYLL). However, when analyzing the mean number of years lost per death, SUDs presented 17.3 mPYLL, one of the highest figures, higher than that observed for high-mortality causes such as neoplasms (13.9 years) or circulatory diseases (12.2 years), and only below groups that concentrate deaths at very early ages, such as pregnancy, childbirth and the puerperium (44.3 years) or perinatal conditions (41.6 years).

Regarding LE at death, people with SUDs reached a mean value of 66.6 years, lower than that recorded for neoplasms (74.1 years) or digestive diseases (78.5 years), and similar to that of external causes (67.2 years).

Table 4
Premature mortality indicators for substance use disorders and major causes of death in Spain, 2016–2020

Diagnostic group	PYLL	Diagnostic group	mPYLL	Diagnostic group	LE
II. Neoplasms	4,745,281	XV. Pregnancy, childbirth and the puerperium	44.25	XV. Pregnancy, childbirth and the puerperium	36.07
IX. Diseases of the circulatory system	2,079,010	XVI. Conditions originating in the perinatal period	41.55	XVI. Conditions originating in the perinatal period	37.61
XX. External causes of mortality	1,253,736	XVII. Congenital malformations, deformations and chromosomal abnormalities	29.90	XVII. Congenital malformations, deformations and chromosomal abnormalities	54.87
X. Diseases of the respiratory system	658,878	XX. External causes of mortality	26.40	**SUDs**	**66.57**
XI. Diseases of the digestive system	616,171	XVIII. Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	19.02	XX. External causes of mortality	67.17
VI-VIII. Diseases of the nervous system and sense organs	432,606	**SUDs**	**17.33**	II. Neoplasms	74.12
I. Infectious and parasitic diseases	429,525	III. Diseases of the blood and blood-forming organs, and certain disorders involving the immune mechanism	15.01	XI. Diseases of the digestive system	78.53
XVIII. Symptoms, signs and abnormal clinical and laboratory findings	303,789	I. Infectious and parasitic diseases	14.80	XVIII. Symptoms, signs and abnormal clinical and laboratory findings	79.08
IV. Endocrine, nutritional and metabolic diseases	228,017	XI. Diseases of the digestive system	14.07	I. Infectious and parasitic diseases	81.03
SUDs	184,158	II. Neoplasms	13.88	III. Diseases of the blood and blood-forming organs	81.27
XIV. Diseases of the genitourinary system	106,415	IX. Diseases of the circulatory system	12.15	IV. Endocrine, nutritional and metabolic diseases	81.98
V. Mental and behavioral disorders	98,350	VI-VIII. Diseases of the nervous system and sense organs	11.96	VI-VIII. Diseases of the central nervous system and sense organs	82.03
XVII. Congenital malformations, deformations and chromosomal abnormalities	75,659	IV. Endocrine, nutritional and metabolic diseases	11.38	IX. Diseases of the circulatory system	82.11
XIII. Diseases of the musculoskeletal system and connective tissue	50,441	XIII. Diseases of the musculoskeletal system and connective tissue	10.95	X. Diseases of the respiratory system	83.07
III. Diseases of the blood and blood-forming organs	43,382	X. Diseases of the respiratory system	10.74	XIII. Diseases of the musculoskeletal system and connective tissue	84.65
XII. Diseases of the skin and subcutaneous tissue	14,558	XII. Diseases of the skin and subcutaneous tissue	9.12	XII. Diseases of the skin and subcutaneous tissue	84.89
XVI. Conditions originating in the perinatal period	5,650	XIV. Diseases of the genitourinary system	8.67	XIV. Diseases of the genitourinary system	85.01
XV. Pregnancy, childbirth and the puerperium	2,253	V. Mental and behavioral disorders	7.88	V. Mental and behavioral disorders	86.57

Note. PYLL = Potential Years of Life Lost; mPYLL = mean Potential Years of Life Lost per death; LE = Life Expectancy.
Source. INE. Authors' own elaboration, 2025.

Discussion

The present study analyzes premature mortality recorded with mention of SUDs on death certificates in Spain between 2016 and 2020, using specific indicators such as PYLL, mPYLL, and LE, stratified by sex and type of substance. The results show that, although SUDs represent a limited proportion of deaths in absolute terms, they present high mPYLL values (17.3 years) and a lower LE (66.6 years) than other high-prevalence causes.

However, these findings should be interpreted taking into account the methodological approach used. Case identification was based on the presence of codes F10–

F19 on death certificates, which allows high diagnostic specificity but entails a relevant underestimation of mortality associated with substance use. Comparison with surveillance systems such as the OEDA shows that in 2020, 872 deaths due to acute reaction to psychoactive substances were recorded, with cocaine present in 52.9% of cases, approximately 460 deaths per year (OEDA, 2022), compared with the 47 cocaine deaths identified in the death records over the entire study period. This discrepancy highlights the difficulty of death certificates in capturing polydrug use and cases in which the substance is not explicitly recorded. In this sense, the results should be interpreted as a conservative estimate of mortality recorded with explicit mention of SUDs, and not as total mortality attributable to substance use.

Regarding the distribution by substance, tobacco and alcohol accounted for the largest absolute burden of PYLL, in line with the literature highlighting their contribution to premature mortality and to the global burden of disease (López et al., 2006; Rehm et al., 2017; WHO, 2024). In contrast, illegal drugs, especially cocaine, opioids, and polydrug use situations, presented higher mPYLL values. This pattern is consistent with international reports and toxicological surveillance systems, in which polydrug use is present in the majority of deaths due to acute reaction, which prevents it being adequately captured in registers based exclusively on clinical certification (EMCDDA, 2024; OEDA, 2022; UNODC, 2023).

The analysis by sex shows that men account for the largest absolute burden of premature mortality in terms of PYLL, with a ratio of 4:1 with respect to women, in line with the 2024 Global Burden of Disease Study (GBD, 2024). In women, the overall mPYLL was slightly higher than that observed in men, although the differences in mean and median age at death were small. This descriptive finding can be contextualized in light of international studies that have pointed to possible sex differences in stigmatization, access to treatment, and clinical course in people with SUDs (Apsley et al., 2023; Molina-Fernández et al., 2024; Meyers et al., 2021; Webb et al., 2022; Pinedo et al., 2020).

The results are consistent with what has been described in the international literature, which estimates the reduction in LE in people with SUDs at between 10 and 20 years (Kim et al., 2025; Yukhnenko et al., 2023) and mPYLL at between 15 and 25 years (Glei & Preston, 2020; Rehm, 2020). Studies such as that of Degenhardt et al. (2018) have also pointed to the high risk of premature mortality associated with opioid and stimulant use, especially at young ages. These comparisons should be interpreted with caution, given that many of these studies estimate attributable mortality, whereas the present work analyzes mortality recorded with an explicit diagnosis.

Compared with other major causes of death, recorded SUDs show a lower absolute burden in PYLL, but indicators compatible with a greater concentration of deaths at relatively earlier ages, in line with what has been described in the international literature (Jalal et al., 2020; Shiels et al., 2019; Svensson et al., 2022). These results should be interpreted with caution since, although the indicators have been calculated homogeneously from death certificates, there are differences in the capture of causes, and SUDs tend to be underrepresented compared with other causes such as neoplasms or cardiovascular diseases.

From a public health perspective, these results support the usefulness of incorporating premature mortality indicators into epidemiological surveillance and suggest the advisability of strengthening prevention, harm reduction, and treatment access strategies, with attention to differences by sex and substance.

Among the main limitations, the exclusive use of codes F10–F19 to identify cases stands out, which probably underestimates mortality associated with substance use, especially in comparison with other information systems that use broader criteria, such as toxicological and forensic registers (OEDA, 2022). In addition, the inclusion of these codes in any position on the certificate, without distinguishing between the underlying cause and contributing causes, introduces heterogeneity in the attribution of the cause of death. Consequently, the results should be interpreted as a conservative estimate of mortality recorded with mention of SUDs. Likewise, no measures of uncertainty were calculated and no statistical tests were performed, so the observed differences should be interpreted in descriptive terms. Although the study is based on an exhaustive population-based register and is not subject to sampling error, the precision of the results may be affected by other sources of uncertainty, such as the quality of coding, the completion of death certificates, and the heterogeneity arising from the inclusion of underlying and contributing causes.

In conclusion, mortality recorded with mention of SUDs shows a relevant burden of premature mortality in Spain, with differentiated patterns according to sex and type of substance. These findings reinforce the interest in incorporating premature mortality indicators into epidemiological surveillance and may be useful for guiding preventive and care planning.

Acknowledgements

The authors thank the National Statistics Institute (INE) for access to the mortality data used. The collaboration of the Spanish Observatory on Drugs and Addictions (OEDA) is also acknowledged for the complementary information used in contextualizing the study. This work

has not received any specific funding, competitive or non-competitive, for its preparation.

Conflict of interest

The authors declare that they have no conflicts of interest.

Author contributions

José María Rosales-Crespo: Conceptualization, Methodology, Formal analysis, Data curation, Visualization, Writing – original draft, Writing – review & editing, Project administration.

Carolina Lagares-Franco: Methodology, Validation, Supervision, Writing – review & editing.

José Almenara-Barrios: Conceptualization, Validation, Supervision, Writing – review & editing.

Antonio Linares-Cobacho: Resources, Writing – review & editing.

Cristina O'Ferrall-González: Validation, Supervision, Writing – review & editing.

Declaration on the use of generative artificial intelligence

During the revision of the manuscript, a generative artificial intelligence tool was used as support for tasks of language improvement and revision of writing and style. The authors fully reviewed, edited, and validated the final version of the manuscript and assume full responsibility for its content.

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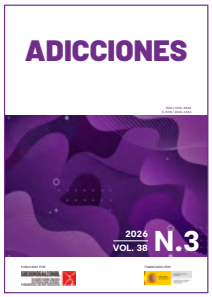
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ADICCIONES
2026 ■ VOL. 38 ■ N. 3 ■ PAGES 175–184
www.adicciones.es



ORIGINAL

The true meaning behind the concept of "drink responsibly" or "moderate consumption" in young people: An experimental study

El verdadero significado del concepto de "consumo responsable" o "consumo moderado" en los jóvenes: Un estudio experimental

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Abstract

Aims: The objective of this study was to examine young people's perceptions and perceived thresholds of "responsible", "moderate", and "risky" alcohol consumption. *Methods:* We conducted an experimental vignette-based study with 242 university students randomly assigned to one of five scenarios: (A) responsible drinking in general, (B) moderate drinking in general, (C) responsible drinking in a party context, (D) moderate drinking in a party context, and (E) risky drinking. Participants were provided with standardized materials (e.g., bottles, glasses, ice) and asked to represent the amount of alcohol corresponding to their assigned scenario. We then measured the alcohol content of each representation and converted it into grams of alcohol. *Results:* Participants attributed a median of 26.4 grams of alcohol to responsible or moderate drinking in a general context. These amounts increased in party settings, reaching medians of 33.5 grams for responsible drinking and 48.5 grams for moderate drinking. The median amount considered risky was 102.8 grams per occasion. Participants classified as hazardous drinkers (AUDIT-C) consistently reported higher perceived thresholds across all scenarios. *Conclusions:* Young people interpret "responsible" and "moderate" drinking as involving alcohol quantities that exceed public health recommendations, particularly in social contexts. These findings highlight the limitations of industry-led messages and support the need for clearer, evidence-based communication strategies developed by public health professionals.

Keywords: alcohol, young adult, drink responsibly, moderate consumption, grams of alcohol, college students

Resumen

Objetivo: El objetivo de este estudio era examinar las percepciones de los jóvenes y los umbrales que estos asocian con el consumo de alcohol «responsable», «moderado» y «de riesgo». *Métodos:* Llevamos a cabo un estudio experimental basado en viñetas con 242 estudiantes universitarios asignados aleatoriamente a uno de cinco escenarios: (A) consumo responsable de alcohol en general, (B) consumo moderado de alcohol en general, (C) consumo responsable de alcohol en el contexto de una fiesta, (D) consumo moderado de alcohol en el contexto de una fiesta y (E) consumo de riesgo. Se proporcionó a los participantes material estandarizado (por ejemplo, botellas, vasos, hielo) y se les pidió que representaran la cantidad de alcohol correspondiente al escenario que se les había asignado. A continuación, medimos el contenido de alcohol de cada representación y lo convertimos en gramos de alcohol. *Resultados:* Los participantes atribuyeron una mediana de 26,4 gramos de alcohol al consumo responsable o moderado en un contexto general. Estas cantidades aumentaron en entornos de fiesta, alcanzando medianas de 33,5 gramos para el consumo responsable y de 48,5 gramos para el consumo moderado. La cantidad mediana considerada de riesgo fue de 102,8 gramos por ocasión. Los participantes clasificados como bebedores de riesgo (AUDIT-C) informaron sistemáticamente de umbrales percibidos más altos en todos los escenarios. *Conclusiones:* Los jóvenes interpretan que el consumo «responsable» y «moderado» de alcohol implica cantidades que superan las recomendaciones de salud pública, especialmente en contextos sociales. Estos hallazgos ponen de relieve las limitaciones de los mensajes impulsados por la industria y respaldan la necesidad de estrategias de comunicación más claras y basadas en la evidencia, desarrolladas por profesionales de la salud pública.

Palabras clave: alcohol, adulto joven, beber con responsabilidad, consumo moderado, gramos de alcohol, estudiantes universitarios

■ *Received: May 2025; Accepted: May 2026.*

■ ISSN: 0214-4840 / E-ISSN: 2604-6334

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Alcohol consumption among adolescents and young adults represents a major public health concern, as it is associated with a wide range of adverse health outcomes and social problems that may hinder a successful transition into adulthood (Ellickson et al., 2003; Schulenberg & Maggs, 2002). In Spain, among individuals aged 15–24 years, approximately 62% reported alcohol consumption in the past month, 1.3% reported daily use, and around 10% engaged in risky drinking (Plan Nacional Sobre Drogas, 2021).

Alcohol use among young people is shaped by a complex interplay of environmental, social, and individual factors, including social norms, peer influence, family context, emotional factors, leisure environments, and the availability and accessibility of alcohol (Ares-Maneiro et al., 2026; Teixidó-Compañó et al., 2023). In particular, the widespread availability of alcohol contributes not only to increased consumption but also to its social normalization (Sureda et al., 2017, 2018).

Alcohol marketing and advertising constitute another key driver of both consumption and normalization processes (Pastor et al., 2022; Villalbí et al., 2019). A substantial body of evidence, including longitudinal studies and systematic reviews, has demonstrated that exposure to alcohol advertising is associated with earlier initiation, higher levels of consumption, and more hazardous drinking patterns among young (Anderson et al., 2009; Ellickson et al., 2005; Smith & Foxcroft, 2009). In response to these concerns, the alcohol industry has implemented self-regulation strategies, often promoting messages such as "drink responsibly" or "moderate consumption." However, these messages are frequently ambiguous and have not been shown to reduce alcohol consumption (Jones et al., 2017). This may reflect inherent conflicts of interest, whereby industry messaging tends to normalize consumption while framing it as safe, thereby blurring the distinction between moderate and risky drinking (van Schalkwyk et al., 2022).

At the same time, young people often exhibit a reduced perception of risk associated with alcohol consumption. Previous research shows that a substantial proportion of adolescents perceive regular or episodic drinking as posing little or no health risk (Moral-Jiménez et al., 2011) and this "low-risk" perception has been identified as a key factor in both the initiation and maintenance of alcohol use (Pons & Buelga, 2011). From this perspective, how young people interpret normative messages about alcohol consumption becomes particularly relevant.

Despite the pervasive utilization of terms such as "drink responsibly" in alcohol advertising, there is a paucity of evidence concerning the way young people interpret these messages in concrete terms. There is a paucity of research on how these abstract concepts are translated into perceived acceptable quantities of alcohol consumption, which may ultimately influence drinking behaviors. The objective of this study was to examine young people's perceptions and perceived thresholds of "responsible", "moderate", and "risky" alcohol consumption.

Methods

Study Design and Participants

This study employed an experimental vignette-based design to examine how young people operationalize the concepts of "responsible", "moderate", and "risky" alcohol consumption. Experimental scenarios were selected as an appropriate methodological approach because they allow the standardization of contextual cues (e.g., advertising messages, drinking environments) while capturing subjective interpretations of socially constructed concepts (Visser et al., 2022).

The five scenarios were designed to reflect two key dimensions identified in the literature:

1. Type of normative message (responsible vs. moderate drinking), commonly used in alcohol industry self-regulation, and
2. Context of consumption (general vs. party setting), given evidence that drinking norms vary by social environment.

The scenario asked Scenarios were

- Scenario A: "In general, how much alcohol do you think constitutes responsible consumption, excluding health conditions, driving, pregnancy, etc.
- Scenario B: In general, how much alcohol do you think constitutes moderate consumption, excluding health conditions, driving, pregnancy, etc.
- Scenario C: When you go to a party and want to consume alcohol responsibly, how much do you drink?"
- Scenario D: "When you go to a party and want to drink moderately, how much do you drink?"
- Scenario E addressed the participants' perception of risky levels of alcohol consumption, defined as levels that could potentially harm their health during a single drinking session, with the exclusion of health conditions, driving, and pregnancy.

The study included 242 university students enrolled in health and social science degrees. Participants were randomly assigned to one of five experimental conditions (approximately $n \approx 50$ per group) using pre-coded envelopes to ensure allocation concealment. Randomization was used to minimize selection bias and to ensure comparability between groups. Baseline characteristics across groups were assessed and showed no statistically significant differences in sociodemographic or behavioral variables, supporting the internal validity of the experimental design.

Experimental Procedure

The experimental setting was designed to simulate a realistic yet controlled representation of alcohol consumption. Participants were young people seated and provided with standardized materials representing different alcoholic beverages (colored water labeled as beer, wine, or spirits), glassware, and ice. Each participant received a written scenario and was instructed to physically construct their interpretation of the assigned drinking situation using the materials provided. This behavioral representation approach was chosen to improve ecological validity and reduce reliance on purely abstract self-reporting. Participants worked independently and were explicitly instructed not to interact with others to avoid social influence bias. No additional clarification was provided during the task to preserve the integrity of individual interpretations.

Upon completion, participants signaled readiness. A trained researcher then recorded the configuration of drinks using a standardized data collection sheet. Subsequently, volumes were measured using calibrated graduated cylinders and converted into grams of alcohol using standard equivalence tables. Participants exited the room immediately after completion to prevent contamination.

Participation in the study was voluntary, and informed consent was obtained from all participants prior to their inclusion. Data was collected anonymously and handled in a confidential manner. The study protocol received a favorable ethical viability assessment from the Research Department of the Fundació Universitària del Bages.

Measures

The primary outcome was the amount of alcohol (in grams) attributed by participants to each conceptual category (responsible, moderate, or risky drinking). Importantly, these variable captures perceived normative thresholds, rather than actual consumption behavior. Specifically, it reflects the quantity of alcohol that participants consider appropriate or typical under each scenario. This operationalization is consistent with research on social norms and risk perception, where subjective thresholds are key determinants of behavior. The use of a behavioral representation task (rather than verbal estimation) enhances construct validity by anchoring responses in concrete quantities.

Additional variables were obtained through a structured questionnaire administered after the experimental task. This questionnaire collected information on sociodemographic characteristics and alcohol consumption patterns. Hazardous drinking was assessed using the validated Alcohol Use Disorders Identification Test–Consumption (AUDIT-C).

Figure 1
Organization of the experimental situation



Data analysis

Alcohol consumption (grams) was summarized using medians and interquartile ranges (IQR) due to non-normal distributions. Differences in categorical sample characteristics across scenarios were examined using Pearson's chi-square test. Between-group differences in alcohol consumption were assessed using non-parametric tests, specifically the Mann–Whitney U test for comparisons between two groups and the Kruskal–Wallis test for comparisons involving more than two groups, as appropriate. Additional analyses were conducted stratified by hazardous drinking status and sex. Statistical significance was defined as $p < 0.05$. All analyses were performed using Stata (version 17).

Results

The final sample comprised 242 university students who were randomly assigned to each of the experimental scenarios (with approximately 50 participants per scenario). A lack of statistically significant differences was observed between the groups (p-value > .05) in terms of sex, place of birth, socioeconomic status, course of study, academic year, employment status, weekly physical activity, cannabis use, or hazardous drinking behavior (see Table 1).

The median alcohol consumption attributed to responsible and moderate drinking (scenarios A and B) was 26.4 grams for the entire sample. This amount increased when responsible or moderate drinking occurred in a nightlife setting (scenarios C and D), with medians of 33.5 and 48.5 grams, respectively. In response to the question regarding the amount of alcohol corresponding to risky consumption (scenario E), participants attributed 102.8 grams to risky drinking (Figure 2).

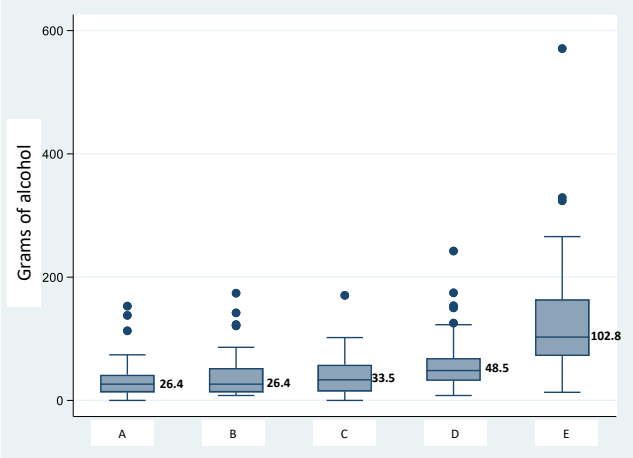
When analyzing the data by gender, combining similar scenarios A+B and C+D, it was observed that boys' participants tended to attribute a higher number of grams to responsible or moderate consumption across all

Table 1
Sample characteristics by scenario

	Scenario	A	B	C	D	E	
	n	50	48	48	48	48	
		%	%	%	%	%	p-value
Gender	Girls	54	67	75	67	56	0.185
Place of birth	Catalonia	53	49	46	51	46	0.940
Socioeconomic level	Better than others	26	27	31	35	29	0.862
Degree	Health Sciences	82	81	81	79	79	0.995
Course	First or second	74	83	85	83	85	0.560
Employed	Yes	32	35	40	42	35	0.874
Physical activity	Yes	80	88	88	90	77	0.362
Ever cannabis use	Yes	66	54	50	63	50	0.367
AUDITC	Hazardous drinker	28	29	40	40	31	0.594

Note. A= Scenario A (responsible alcohol consumption); B= Scenario B (moderate alcohol consumption); C=Scenario C (responsible alcohol consumption when going out to a party); Scenario D (moderate alcohol consumption when going out to a party) and Scenario E (risky (and therefore harmful) consumption for their health).

Figure 2
Medians, 25th and 75th percentile of self-perceived alcohol consumption by scenario. A= Scenario A (responsible alcohol consumption); B= Scenario B (moderate alcohol consumption); C=Scenario C (responsible alcohol consumption when going out to a party); Scenario D (moderate alcohol consumption when going out to a party) and Scenario E (risky (and therefore harmful) consumption for their health)

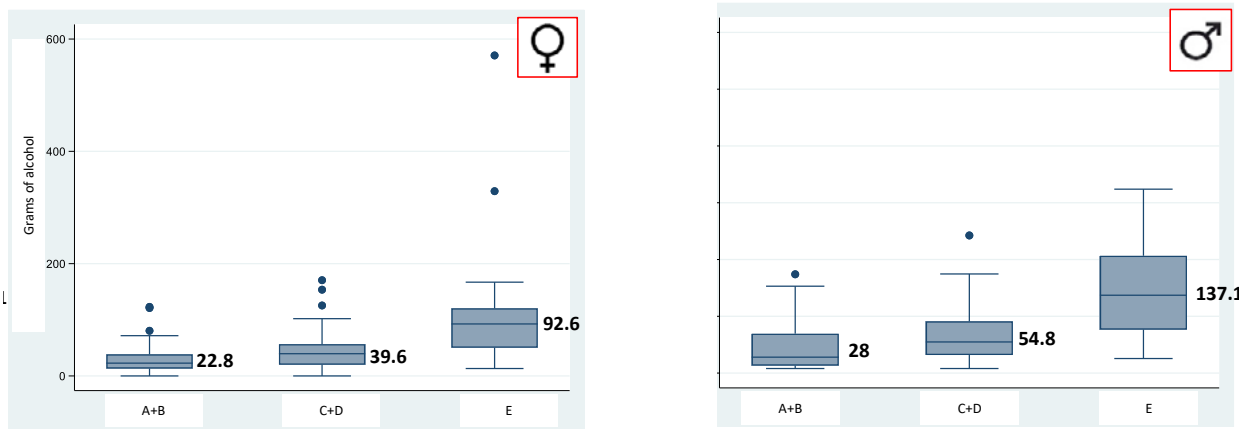


Note. *No statistically significant difference was found between scenarios A and B (p = .44), whereas a significant difference was observed between C and D (p = .012), with higher alcohol consumption in D. Overall, the Kruskal–Wallis test indicated significant differences across scenarios A,B, C and D (p = .0004), driven mainly by higher values in scenario D.

scenarios. Specifically, for boys, the median attribution for risky consumption was 137.1 grams per occasion, while for girls' participants, the median was 92.6 grams per occasion (figure 3).

Across scenarios, alcohol consumption (grams) was consistently higher among people classified as hazardous drinkers according to AUDIT-C compared with non-hazardous drinkers. This pattern was most pronounced in combined scenarios A+B and C+D, where hazardous drinkers showed significantly higher median consumption in the total sample (A+B: 44.4 vs 23.8 grams, p = 0.0057; C+D: 52.8 vs 30.1 grams, p = 0.0001), with similar trends observed in both girls and boys. Differences were less consistent in scenario E, where, although median consumption remained higher among hazardous drinkers, differences were not statistically significant. Overall, alcohol consumption increased across scenarios from A+B to C+D and was highest in scenario E, with consistently higher values in boys than girls.

Figure 3
Medians, 25th and 75th percentile of self-perceived alcohol consumption by scenario and gender. A+B= Scenarios A+B (responsible alcohol consumption or moderate alcohol consumption); C+D=Scenarios C+D (responsible alcohol consumption or moderate alcohol consumption when going out to a party) and Scenario E (risky (and therefore harmful) consumption for their health)



Note. * Compared to groups A+B and C+D, significant differences were observed in both girls (p = .0045) and boys (p = .0311), with higher alcohol consumption in scenarios C+D.

Table 2
Medians and 95% confidence intervals of grams of alcohol by scenario and considering whether the person is a hazardous drinker or not, measured using the AUDIT-C test

	Girls			Boys			Total		
	n	Median	p-value	n	Median	p-value	n	Median	p-value
Scenario A+B									
Hazardous drinker	12	29.4	.1010	16	61.5	.0518	28	44.4	.0057
No Hazardous drinker	47	22.4		23	26.4		70	23.8	
Scenario C+D									
Hazardous drinker	27	52.2	.0009	11	76.7	.0255	38	52.8	.0001
No Hazardous drinker	41	28.4		17	45.8		58	30.1	
Scenario E									
Hazardous drinker	10	99.7	.3933	5	160.9	.5913	15	104	.2661
No Hazardous drinker	17	85.5		16	126.4		33	92.6	

Note. A= Scenario A (responsible alcohol consumption); B= Scenario B (moderate alcohol consumption); C=Scenario C (responsible alcohol consumption when going out to a party); Scenario D (moderate alcohol consumption when going out to a party) and Scenario E (risky (and therefore harmful) consumption for their health).

Discussion

Our study yielded several key findings. First, the amounts of alcohol perceived by young people as moderate and responsible drinking would be considered risky by the World Health Organization (20 grams for women and 40 grams for men). Second, these moderate or responsible drinking amounts increase when represented in a party setting. Third, the median amount of alcohol young people consider to be risky consumption is 102 grams per drinking occasion. Finally, hazardous drinkers tend to perceive responsible or moderate consumption as involving higher alcohol quantities compared to non-hazardous drinkers, particularly in a party environment.

Before delving deeper into the discussion, it is essential to highlight the study's strengths and limitations. Among the strengths, it is important to note that this is the first study to examine the true meaning of moderate and responsible drinking. Additionally, the study uses an experimental design with five randomly assigned groups and objective measurements of alcohol consumption (in grams). Regarding the limitations of the study, it should be noted that the investigation encompassed a total of 242 participants, all of whom were university students. This restriction may compromise the generalizability of the findings, as alcohol consumption and knowledge about its consequences may vary among non-university-aged individuals.

Scientific evidence indicates a link between alcohol advertising and increased alcohol consumption in society, particularly among young people (Anderson et al., 2009; Bosque-Prous et al., 2014; Ellickson et al., 2005; Smith & Foxcroft, 2009). The primary goal of any industry is to sell its products, a goal that often conflicts with public health strategies, especially when the product may harm health. To mitigate the adverse consequences of alcohol consumption, it is imperative to reduce its consumption (Madden & McCambridge, 2021). The alcohol industry employs diverse strategies to promote its products, one of which is to enhance the appeal of alcohol by associating it with positive experiences. Through alcohol advertising, the industry cultivates an image of alcohol being associated with positive emotions, sports, friendship, and other desirable experiences, thereby conditioning consumers to associate alcohol with these feelings (Connor et al., 2014).

When the industry engages in self-regulation, it often utilizes messages that promote moderate or responsible drinking. However, our study found that young people perceive these concepts as involving high amounts of alcohol, which would be classified as risky drinking. This suggests that relying on young people to define their understanding of moderate and responsible alcohol consumption may not be the most effective strategy for health prevention. This finding aligns with conclusions from other studies on labeling and health messages on alcohol packaging promoted by industry. When industry self-regulates, labeling regulations often exhibit significant shortcomings (Tinawi et al., 2018).

The promotion of varied messages is imperative, given their capacity to influence the risky perception and drinking behavior of young individuals. Contemporary evidence underscores the significance of promoting labeling that incorporates nutritional information and health-related messages (Martin-Moreno et al., 2013). Nevertheless, information regarding standard drinks and serving sizes is only efficacious when integrated with comprehensive health education initiatives (Jones & Gregory, 2009; Martin-Moreno et al., 2013). It is imperative to acknowledge the profound social normalization of alcohol, necessitating the meticulous design and implementation of prevention messages by experts in the field. The efficacy of these messages is contingent on individual characteristics, as evidenced by research demonstrating the variability in response to identical messages (Aiken et al., 2018; Noel et al., 2018). In the UK, for instance, research indicates that only approximately one-third of participants recall having seen product-related information, health messages, or warnings on alcohol packaging in the past month (Critchlow et al., 2020).

A notable finding of the present study is the variability of perceptions concerning moderate, responsible, and risky drinking, which is contingent upon individual drinking patterns. This phenomenon may be attributed to the experiences of young individuals in the hours following alcohol consumption (Merrill et al., 2018). In this context, alcohol tolerance emerges as a potentially substantial factor. Tolerance is defined as the phenomenon in which an individual requires a greater quantity of alcohol to elicit the same physiological effects over time (Elvig et al., 2021). If young individuals assess problematic alcohol consumption based on the most immediate consequences, it could potentially lead to adverse outcomes in the future, given the potential for increasing tolerance. These findings are consistent with prior research conducted in U.S. colleges (Noel et al., 2018) and among adults in Canada (Sanchez-Ramirez et al., 2018), which found a lower perception of alcohol-related harms in individuals with higher levels of alcohol use.

The challenge of combating the normalization of alcohol consumption is attributable to the profound integration of alcohol into societal norms. Alcohol is ubiquitous and easily accessible, as evidenced by numerous studies (Ares-Maneiro et al., 2026; Martin-Turrero et al., 2026; Sureda et al., 2018). Consequently, the most efficacious strategies concentrate on reducing their accessibility and affordability. It is imperative to implement measures that make alcohol harder to obtain while also emphasizing strategies aimed at denormalizing its (Hobday et al., 2017; Knai et al., 2015; Villalbí et al., 2014). Additionally, it is crucial to acknowledge that alcohol consumption is influenced by multiple factors, and preventive strategies must address known risk factors specific to young populations. For instance, the characteristics of an individual's place of residence have been shown to significantly impact the alcohol environment, thereby shaping drinking behaviors (Ares-Maneiro et al., 2026; Font-Ribera et al., 2013; Molina-de la Fuente et al., 2021; Obradors-Rial et al., 2020).

Conclusions

Our findings suggest that messages promoting moderate and responsible drinking are interpreted by young people as endorsing the consumption of large quantities of alcohol. Therefore, it is crucial that preventive messages regarding substance use are not left to the discretion of the industry but are instead guided and overseen by professionals specializing in addiction prevention.

Declaration of interest

The authors of this manuscript declare no conflicts of interest. Albert Espelt is associate editor of the Addictions Journal but was not involved in the editorial process. Xisca Sureda currently holds the position of Government

Delegate for the Spanish National Plan on Drugs. Her current role had no influence on the funding decision, study design, data collection, analysis, interpretation of results, or the decision to publish this work. The research was conducted with full scientific independence, and the author declares no conflicts of interest related to her institutional position.

Funding

This research received no external funding.

Institutional Review Board Statement

The study was approved by the Institutional Review Board (or Ethics Committee) of the Open University of Catalonia (code 20190320_mbosquep_alcohol).

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Contributions

Albert Espelt and Iñaki Galán contributed to the conceptualization and methodology of the study. Aina Lafon-Guasch was responsible for the pilot phase investigation and project administration, with contributions from Ester Teixidó-Compañó, Marina Bosque-Prous, and Albert Espelt. Marina Bosque-Prous, Ester Teixidó-Compañó, Ester Colillas-Malet, Núria Obradors-Rial, and Albert Espelt contributed to the methodology, investigation, resources, and project administration, including the coordination of fieldwork and data collection. Albert Espelt conducted the formal analysis, curated the data, prepared the original draft of the manuscript, and supervised the integration of comments and contributions from all co-authors throughout the revision process. Xisca Sureda and all co-authors contributed to validation and writing – review & editing of successive versions of the manuscript. All authors approved the final version of the manuscript and agreed to be accountable for all aspects of the work. This study was developed within the Alcohol Working Group of the Spanish Society of Epidemiology.

Generative artificial intelligence

Generative artificial intelligence was used to improve the English writing of the manuscript. Specifically, the software DeepL was used for English language editing and refinement.

Acknowledgements

We would like to thank the Youth Center of Sant Hipòlit de Voltregà for kindly providing the space to conduct the pilot study. The pilot phase was essential for refining the study procedures and experimental design, and it helped ensure the feasibility and methodological robustness of the study presented in this manuscript. We are especially grateful to the volunteers who generously gave their time and support during the pilot phase. We also sincerely thank A. Solà, J. Crosas, I. Camarero, J. Icart, M. Andreu and all the other people who contributed their perspectives and support, helping to make both the study and the pilot phase possible.

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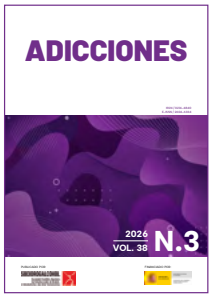
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ADICCIONES
2026 ■ VOL. 38 ■ N. 3 ■ PAGES 185–198
www.adicciones.es



ORIGINAL

One-year outcomes of inpatient treatment for alcohol use disorder: A seven-week programme in the Czech Republic

Resultados al año del tratamiento hospitalario del trastorno por consumo de alcohol: Un programa de siete semanas en la República Checa

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Abstract

Long-term outcomes of inpatient treatment for alcohol use disorder (AUD) remain insufficiently studied in Central and Eastern Europe. This study examined 12-month post-treatment outcomes following a seven-week inpatient psychotherapeutic programme at Pilsen University Hospital and analysed factors associated with abstinence and relapse. A single-group prospective cohort of 62 patients (41.9% women) diagnosed with alcohol dependence or harmful use (ICD-10) was assessed using standardised instruments (WHOQOL-BREF and EuropASI) and followed up at the 6-month and 12-month follow-ups, with collateral informant verification. Continuous one-year abstinence was observed in 23 patients (37.1%), with an additional 5 (8.1%) reporting a single lapse; point abstinence at one year was 56.5%. Relapse occurred predominantly during the first 6 months after discharge. Initiation of facility-based aftercare within one month after discharge was associated with more favourable outcomes, while higher baseline alcohol severity was associated with earlier relapse. Quality of life, as measured by the WHOQOL-BREF, improved over time, and higher quality of life at the 6-month follow-up was associated with more favourable abstinence outcomes. These findings suggest that the early post-treatment period represents a particularly vulnerable phase of recovery and that aftercare participation, dependence severity, and quality of life may be relevant correlates of treatment outcomes.

Keywords: alcohol use disorder, inpatient treatment, abstinence, relapse, quality of life, treatment outcomes

Resumen

Los resultados a largo plazo del tratamiento hospitalario del trastorno por consumo de alcohol (TCA) siguen siendo insuficientemente estudiados en Europa Central y Oriental. Este estudio examinó los resultados a los 12 meses posteriores al tratamiento tras un programa psicoterapéutico hospitalario de siete semanas en el Hospital Universitario de Plzeň y analizó los factores asociados con la abstinencia y la recaída. Se evaluó una cohorte prospectiva de un solo grupo compuesta por 62 pacientes (41,9 % mujeres) diagnosticados con dependencia del alcohol o consumo perjudicial (CIE-10) mediante instrumentos estandarizados (WHOQOL-BREF, EuropASI), con seguimiento a los 6 y 12 meses y verificación colateral. Se observó abstinencia continua durante un año en 23 pacientes (37,1 %), mientras que otros 5 (8,1 %) informaron un único episodio puntual de consumo; la abstinencia puntual al cabo de un año fue del 56,5 %. Las recaídas ocurrieron predominantemente durante los primeros seis meses. El inicio de la atención de seguimiento en un programa hospitalario especializado dentro del primer mes tras el alta se asoció con resultados más favorables, mientras que una mayor gravedad inicial del consumo de alcohol se relacionó con una recaída más temprana. La calidad de vida, medida mediante el WHOQOL-BREF, mejoró con el tiempo, y una mayor calidad de vida en el seguimiento a los 6 meses se asoció con resultados de abstinencia más favorables. Estos hallazgos sugieren que el período temprano posterior al tratamiento representa una fase particularmente vulnerable de la recuperación y que la participación en cuidados de seguimiento, la gravedad de la dependencia y la calidad de vida pueden ser correlatos relevantes de los resultados del tratamiento.

Palabras clave: trastorno por consumo de alcohol, tratamiento hospitalario, abstinencia, recaída, calidad de vida, resultados del tratamiento

■ *Received: October 2025; Accepted: June 2026.*

■ ISSN: 0214-4840 / E-ISSN: 2604-6334

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With an annual per capita consumption of 13.3 litres of pure alcohol, the Czech Republic ranks among the countries with the highest alcohol consumption in the European Union, where the average in 2019 was 11.0 litres (World Health Organization, 2023). According to the 2024 National Survey, 7.4% of Czech adults fall into the category of harmful drinking (Králíková et al., 2024). In addition, alcohol contributes to 6,000–7,000 deaths annually, which accounts for approximately 6% of all-cause mortality in the Czech Republic (National Monitoring Centre for Drugs and Addiction, 2024).

Current neurobiological evidence supports the understanding of substance use disorders (SUD), including alcohol use disorder (AUD), as chronic, relapsing conditions. Accordingly, increasing emphasis is placed on long-term and continuous care (the Chronic Care Model), integrating treatment for comorbid mental and physical conditions (Volkow et al., 2017). Previous findings, including our own, indicate that patients with AUD are at greater risk of relapse and mortality within the first years after treatment compared with illicit drug users (Dawson et al., 2007; Tibenská et al., 2016; Volkow et al., 2017). Quality of life has increasingly been recognised as an important recovery-oriented outcome (Laudet, 2011).

The system of substance use treatment in the Czech Republic involves outpatient, detoxification, and inpatient care, including therapeutic communities. These services form an integrated network in which medium-term inpatient programmes, typically lasting from 5 to 14 weeks, play a key role (Miovský et al., 2013). Despite the wide range of services, up to 93% of individuals with severe AUD are not engaged in any form of treatment. The treatment gap thus remains extremely high (Kågström et al., 2019).

Systematic evaluation of inpatient AUD treatment outcomes in the Czech Republic remains limited. There are only few studies and they are methodologically heterogeneous, particularly from the perspective of abstinence definitions, follow-up procedures, and handling of attrition (Skorkovský et al., 2023). Similar limitations, particularly the small number of studies, high dropout rates, and inconsistent follow-up intervals, have been observed internationally, as highlighted in a systematic review of the effectiveness of therapeutic communities (Suárez-Castro et al., 2024).

International research suggests that post-treatment outcomes in alcohol use disorder are primarily associated with baseline severity of alcohol-related problems, continuing care following discharge, and with a broader recovery-related functioning, including quality of life. Greater clinical severity has been linked to poorer prognosis and earlier relapse (López-Goñi et al., 2012; Stohs et al., 2019), whereas continuing care and better treatment retention are associated with more favourable long-term outcomes (Blevins et al., 2017; Dacosta-Sánchez et al., 2022; McKellar et al., 2003). Increasing attention has also been paid to patient-centred recovery indicators, particularly quality of life, which may reflect not only treatment outcome but also the stability of remission and the capacity to sustain behavioural change over time (Carlon et al., 2022; Dayal et al., 2024; Laudet, 2011).

The aim of the present prospective study was to examine 12-month post-treatment outcomes of patients with alcohol use disorder following participation in a specialised residential programme in the Czech Republic, with particular focus on abstinence outcomes, relapse timing, aftercare participation, and quality of life. Based on previous research, we hypothesised that (1) relapse risk would be highest during the first 6 months after treatment, (2) greater baseline severity of alcohol use would be associated with poorer outcomes, (3) aftercare participation in the facility-based programme would be associated with more favourable abstinence outcomes, and (4) quality of life, measured using the WHOQOL-BREF questionnaire, would improve during follow-up and would be associated with more favourable abstinence outcomes.

Method

A single-group longitudinal pre-test-post-test study was conducted to examine 12-month outcomes following a seven-week inpatient treatment programme. Follow-up data were collected through telephone interviews with patients and their collateral informants at two time points: the 6-month and 12-month follow-ups. The response rate for abstinence data was 96.8%. The primary outcome measures were abstinence rate and quality of life. We used the term single lapse for a single, time-limited episode of alcohol use followed by a return to abstinence, whereas relapse denotes repeated or sustained alcohol use beyond a single lapse. A single-group design was used due to ethical and organisational constraints. In the given healthcare setting, waiting times for inpatient alcohol use disorder treatment are substantially shorter than the 12-month follow-up period, making a waiting-list control group infeasible. In addition, withholding or delaying indicated treatment for research purposes would raise ethical concerns given the morbidity and mortality associated with untreated alcohol use disorder.

Participants

The study included all adult patients (≥ 18 years) who were hospitalised at the Addiction Treatment Ward of the Department of Psychiatry of Pilsen University Hospital for ≥3 days between March 2022 and February 2024 and who met ICD-10 criteria for F10.1 (harmful use of alcohol) or F10.2 (alcohol dependence syndrome). Patients with current harmful use or dependence on other substances

(e.g., stimulants or opioids; F19.1/F19.2) were not eligible for inclusion in the study, although they could be admitted to the ward. Patients with a history of other substance use disorders who met diagnostic criteria only for harmful use of or dependence on alcohol at the time of admission were eligible for inclusion.

96.9% of eligible patients approached for inclusion agreed to participate in the study. No study-specific exclusion criteria were applied.

The ward applies standard clinical contraindications to admission to the inpatient psychotherapeutic programme, including severe physical illness requiring urgent care, acute psychosis (F2X.X according to ICD-10) requiring prioritised treatment, organic brain disorders (F01.X, F02.X, F03, F04 according to ICD-10), and intellectual disability (F70.X according to ICD-10), as these conditions limit suitability for intensive group-based psychotherapy.

Comorbid psychiatric disorders other than psychotic disorders were not exclusion criteria for admission or study participation and were assessed as part of the baseline psychiatric examination.

During the study period, no patient meeting the inclusion criteria was excluded from participation either for study-related reasons or due to these clinical contraindications.

Collateral informants

Almost all patients (90.3%) identified a collateral informant for telephone verification of follow-up data. These were typically family members, most commonly partners (50.8%), parents (24.6%), or adult children (14.8%); less frequently, they were more distant relatives or close friends (9.8%). If patients' life circumstances changed during follow-up, the collateral informant could be replaced by another suitable contact person. Informant reports were used either as an alternative data source when patients could not be reached or as a means of verifying self-reported information.

Data collection during hospitalisation

During the first week of the treatment programme, all enrolled patients underwent baseline assessment using standardised tools. Quality of life was measured using the WHOQOL-BREF questionnaire (WHOQOL Group, 1998), yielding an overall WHOQOL-BREF score reflecting participants' perceived quality of life.

Multidimensional assessment of substance use–related problems was performed using the EuropASI instrument (a European adaptation of the Addiction Severity Index, 5th Edition) (Kokkevi & Hartgers, 1995; Kubička & Csémy, 1998). Although the instrument assesses several domains (Medical Status, Employment/Support Status, Alcohol Use, Legal Status, Family and Social Relationships, and Psychiatric Status), the present study focused specifically on the Alcohol Use domain. For this domain, two indicators were obtained:

- *Composite Score (CS):* a quantitative indicator of severity in the given domain, calculated from selected questionnaire items combining objective indicators and the patients' subjective perception. Scores range from 0 to 1, with higher values indicating greater severity.
- *Interviewer Severity Rating (ISR):* a clinical rating of severity in the given domain on a 0–9 scale based on a combination of data gathered during the interview, patients' subjective self-assessment, and the clinician's professional judgement.

The baseline assessment also included an analysis of data from the psychiatric examination, focusing on substance use history, previous therapeutic interventions, and the presence of comorbid psychiatric diagnoses according to ICD-10.

Follow-up

After discharge, the patients were contacted by telephone at two follow-up time points: the 6-month and 12-month follow-ups. The WHOQOL-BREF questionnaire was administered again, along with a structured questionnaire covering abstinence, continuing care, psychosocial functioning, and treatment-related variables. The telephone format was chosen to maximise the response rate and enable clarification of the participants' answers. At the same intervals, collateral informants were also contacted and asked to complete a shortened version of the same questionnaire addressing abstinence and continuing care.

Abstinence was defined as complete abstinence from alcohol during the respective follow-up period, with a single lapse distinguished from relapse. Point abstinence was defined as abstinence from alcohol for at least one month (30 days) prior to the 6- month and 12-month follow-up assessments. Self-reported abstinence was verified by collateral informants whenever available; in cases of discrepancy, the less favourable information was used for analysis. No biological verification (e.g., biomarkers) was performed; abstinence outcomes therefore rely on structured self-report corroborated by collateral information.

All follow-up telephone interviews were conducted by the first author, a physician involved in the treatment programme. The interviewer was aware of baseline clinical information; however, all assessments were based on structured questionnaires with standardised wording to minimise interviewer-related bias. Collateral informants were not informed about the patients' responses and provided their reports independently.

Site description

The Addiction Treatment Ward at the Psychiatric Department of Pilsen University Hospital offers a seven-week inpatient programme intended for men and women

diagnosed with alcohol use disorder (AUD), substance use disorder (SUD), or pathological gambling. Patients are either admitted after undergoing detoxification at the department's detoxification unit or, less commonly, directly referred to the addiction treatment ward if they can prove a minimum of three weeks of abstinence.

The programme is based on open group psychotherapy, with an emphasis on the individual therapeutic plan and work on the client's personal treatment goals. The optimal group size is ten patients. The core modality is an open (rolling) psychotherapy group with limited weekly turnover (typically 0–2 patients entering/leaving per week), which allows continuity of group processes while maintaining admission flexibility. The therapeutic approach combines elements of cognitive-behavioural therapy, motivational techniques, and the 12-step model (Alcoholics Anonymous World Services, 2001), complemented with family sessions, training in relaxation techniques, occupational therapy, physiotherapy, and – where indicated – administration of psychiatric medication (including disulfiram and anti-craving agents). In addition to group sessions, patients complete a set of structured therapeutic assignments (e.g., formulation of an initial treatment request, a more detailed list of problems and treatment goals, a motivational balance exercise, identification of high-risk situations and coping strategies, and a structured contact with a significant other – usually the closest family member). Selected elements of the 12-step approach (notably Steps 1 and 4) are integrated into the programme. Where appropriate and agreed with the patient, craving-management strategies (including imaginal exposure) may be used as an optional component.

The programme is characterised by fewer structured routine-based elements, particularly the absence of a points system and collective sanctions, and places the emphasis on patients' active cooperation and their intrinsic motivation. Where a clearly formulated individual therapeutic contract exists, treatment duration may be extended to ten weeks with predefined target areas and tasks.

Within the Czech context, the seven-week programme represents a short-term inpatient format compared with the more common medium-term programmes lasting approximately 3–4 months. Compared with more traditionally structured inpatient models used in the Czech Republic, the present programme is characterised by a higher emphasis on psychotherapeutic work and individual goal setting, and by a lower reliance on rigid regime-based elements or sanction systems.

Following discharge, patients are encouraged to participate in aftercare groups provided by the same treatment facility. These groups are organised as weekly group psychotherapy sessions intended primarily for abstinent graduates of the inpatient programme, but may also be attended by patients who completed inpatient treatment at other facilities. Prior to each session, abstinence is typically verified using a breath alcohol test. The aftercare programme represents the most common form of continuing care offered by the department and aims to support maintenance of abstinence, relapse prevention, and ongoing therapeutic work after completion of inpatient treatment.

Ethical approval

The study was approved by the Ethics Committee of Pilsen University Hospital and the Faculty of Medicine, Charles University in Pilsen (approval no. 408/21; 4 November 2021). All participants received oral and written information about the study and those who agreed to participate signed an informed consent. The participants also provided written consent for the involvement of collateral informants.

Statistical analysis

As the primary outcome of the study, abstinence was evaluated in three ways: 1) continuous 12-month abstinence (dichotomous variable): patients either remained fully abstinent for 12 months or experienced relapse (i.e., alcohol use beyond a single lapse, those with a single lapse were excluded from this analysis); 2) time to first relapse (survival-like time-to-event analysis of the relapse-free proportion of patients over the course of the follow-up): the number of months immediately post-discharge during which the patient remained continuously abstinent (rounded down to whole months, intervals reported as 30 days or 4 weeks were considered equal to 1 month); 3) point abstinence at the 12-month follow-up (dichotomous variable): whether the patient was abstinent for at least one month prior to the 12-month follow-up assessment. Continuous abstinence and point abstinence were analysed using Mann-Whitney U-test (in relation to quantitative variables, most of which were non-normally distributed) and Fisher's exact test (in relation to categorical variables and also for the comparison of relapse rates between the first and second half of the follow-up). The time to first relapse was assessed using methods of survival analysis, i.e. univariable Cox proportional hazards model (continuous variables) and Kaplan-Meier analysis with two- or multiple-sample Gehan-Wilcoxon test (categorical variables).

As aftercare (facility-based programme at the Addiction Treatment Ward of Pilsen University Hospital) is initiated only after discharge from treatment and its initiation is intrinsically linked to continued abstinence, a potential immortal time bias would arise from a simple survival analysis assessing its association with outcomes. To prevent this, a landmark approach was used, defining a one-month post-discharge period for aftercare initiation and starting the survival analysis from this landmark (including only patients who remained abstinent at that time point). Regular participation in the facility-based aftercare

programme was not required for inclusion in the "aftercare" group (i.e., a single initiation of aftercare was sufficient), in order to reduce the bias originating from the intrinsic association between continuous abstinence and consistent participation in continuing care. Participants attending Alcoholics Anonymous or other external continuing care programmes were excluded from this analysis because the timing of initiation was not available, which precluded their inclusion in the landmark design.

The secondary outcome was the change in the WHOQOL-BREF score, calculated by subtracting the baseline score from that at 12-month follow-up. The comparison of quality of life between baseline and the 6-month and 12-month follow-ups was performed using Wilcoxon's matched-pairs test (without Bonferroni correction for the two tests).

To explore whether data missingness was consistent with MCAR, we created missingness indicators for each variable with incomplete data and tested their associations with fully observed baseline characteristics using Mann–Whitney U tests for continuous variables and chi-square or Fisher's exact tests for categorical variables. Missingness was concentrated in follow-up variables, most notably WHOQOL-BREF score at the 12-month follow-up (19.4%) and the 6-month follow-up (17.7%), and showed associations with baseline characteristics, particularly with dependence severity, suggesting that missingness was unlikely to be completely at random. Missing data were omitted from each test individually in a pair-wise manner.

In order to assess the false discovery rate (FDR), a Benjamini-Hochberg procedure covering all statistical tests performed throughout our analysis of the dataset was done. At the baseline significance level of $\alpha = 0.05$, the estimated FDR is 26%, and, in order to achieve the actual conservative FDR of 5%, the individual-test significance threshold needs to be reduced to 0.004.

All reported p-values are two-tailed and the significance level was set at $\alpha = 0.05$. The statistical analysis was done using STATISTICA (version 11Cz, TIBCO Software Inc., Palo Alto, CA, USA).

Results

Sample characteristics and follow-up completeness

The study sample comprised 62 patients. Abstinence data were available for 60 participants (96.8%) due to the use of collateral informants. Four patients (6.5%) died during the follow-up period, all following relapse. WHOQOL-BREF data were available for 90.3% of patients at the 6-month follow-up and 88.7% at the 12-month follow-up.

The sample showed a balanced male/female ratio (41.9% women) with a mean age of 47.8 years. The mean daily alcohol consumption was 122.2 g/day, with substantial variability across participants. Detailed sociodemographic and consumption characteristics are presented in Tables 1 and 2.

Discrepancies between patient and collateral informant reports were infrequent (6.5%), suggesting acceptable reliability of self-reported outcomes.

Table 1
Sample Sociodemographics (N = 62)

Variable	Value
Number of patients	62
Gender – male	36 (58.1%)
Gender – female	26 (41.9%)
Mean age (all)	47.8 years
Age range	23–71 years
Mean age – male	47.9 years
Mean age – female	47.6 years
Family history of alcohol use (at least one parent)	35 (56.5%)
Duration of perceived excessive drinking	mean 6 years
Number of patients with premature termination of treatment	4 (6.5%)
Number of patients in the first treatment episode	41 (66.1%)
Mean age of patients in the first treatment episode	46.6 years
Number of patients with previous treatment episodes	21 (33.9%)
Mean number of treatment episodes (entire sample)	1.76
Maximum number of treatment episodes	8

Table 2
Daily alcohol consumption (30 days prior to treatment admission)

Daily alcohol consumption	g/day
Mean	122.2
95% CI lower bound	97.7
95% CI upper bound	146.8
Median	59.5
Minimum	0.0
Maximum	390.0
>200 g/day (m) or >140 g/day (w)	15 (24.2%)
120–200 g/day (m) or 80–140 g/day (w)	20 (32.3%)
<120 g/day (m) or <80 g/day (w)	27 (43.5%)

Abstinence outcomes, relapse and predictors

Continuous one-year abstinence was observed in 23 patients (37.1%, 95% CI: 25.9–49.8%), with an additional 5 patients (8.1%, 95% CI: 3.0–18.2%) reporting a single lapse. Point abstinence at the 12-month follow-up (i.e. abstinence maintained for at least one month at the time of the one-year follow-up) was achieved by 56.5% of participants.

30 out of 60 patients with available abstinence data experienced relapse (50.0%, 95% CI: 45.9–72.6%) during the first 6 months after treatment, compared with only 2 of the remaining 30 patients (6.7%) during the second 6-month period ($p < 0.001$; difference in proportion 43.3 percentage points, 95% CI: 24.2–56.5%). This temporal pattern is also reflected in the Kaplan–Meier analysis, which shows a steep early decline in relapse-free survival (Fig. 1a).

Higher baseline severity in the EuropASI Alcohol domain assessed by the Interviewer Severity Rating (ISR) was associated with shorter time to relapse ($p = 0.001$). Similar associations were observed for point abstinence and continuous 12-month abstinence ($p = 0.007$ and $p = 0.002$, respectively; Fig. 3). Associations for the Composite Score showed a similar direction but were generally weaker and less consistent across outcomes.

Figure 1

Proportion of patients without relapse after treatment. Shown for the entire sample (a) and according to participation in aftercare (AOD groups = aftercare groups for alcohol and other drug disorders) initiated within one month after discharge (b)

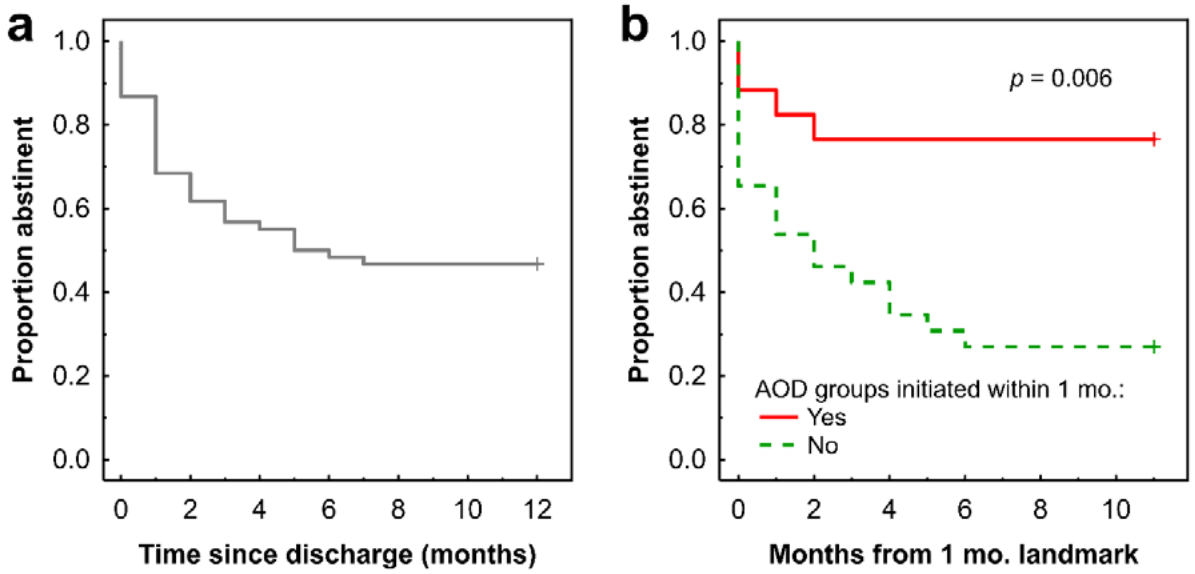


Figure 2

WHOQOL-BREF scores at different study phases (a), WHOQOL-BREF scores at the 6-month follow-up in relation to continuous abstinence (b), and change in WHOQOL-BREF scores at the 12-month follow-up according to the number of previous treatment episodes (c)

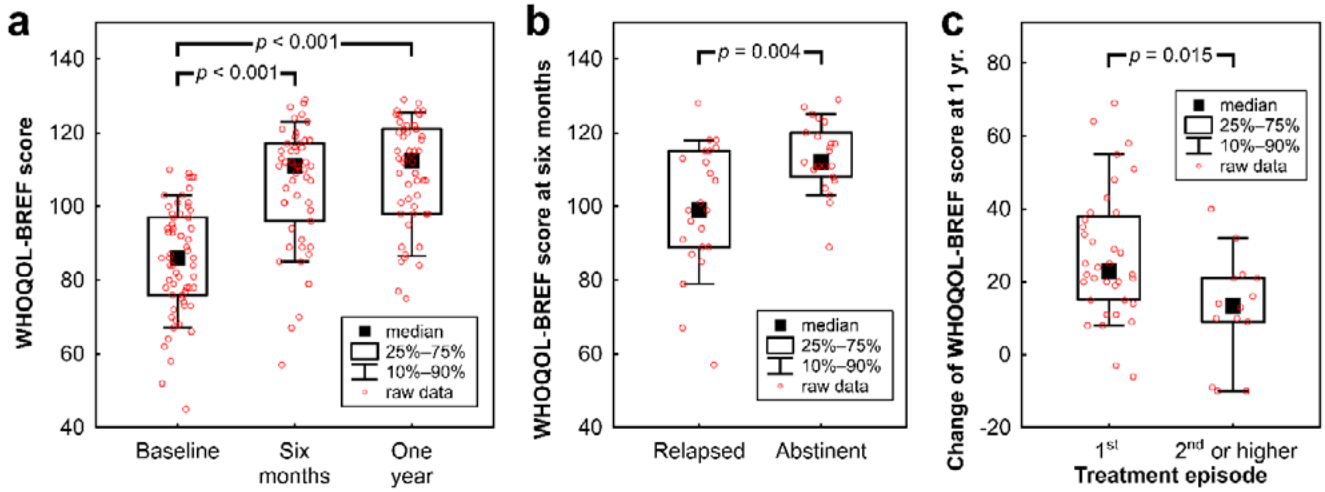


Figure 3
Relationship between severity of dependence, measured by ISR (EuropASI, Alcohol domain), and continuous 12-month abstinence

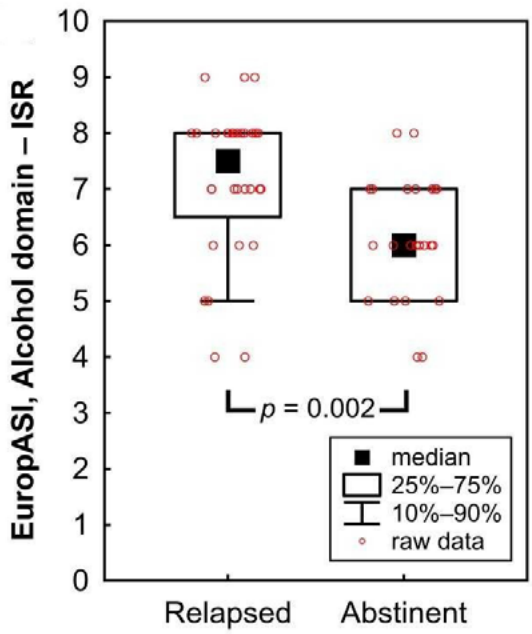
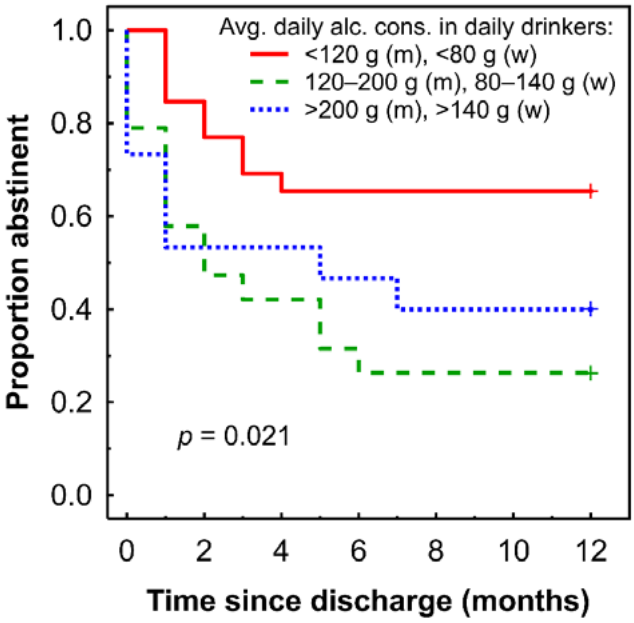


Figure 4
Proportion of relapse-free patients over time after discharge in relation to average daily alcohol consumption, as categorized according to individual thresholds for men (m) and women (w)



Higher mean daily alcohol consumption was weakly associated with shorter time to relapse (p = 0.021; Fig. 4), whereas the self-reported duration of excessive alcohol use was not associated with abstinence outcomes.

Patients who initiated aftercare within one month after discharge (in the same treatment facility) showed a significantly longer time to first relapse than those who did not (p = 0.006; Fig. 1b). Point abstinence at the 12-month follow-up was also markedly higher in the aftercare group: 16/16 patients (100%, 95% CI: 76.6–100%) remained abstinent, compared with 8/23 patients (34.8%, 95% CI: 18.5–55.6%) without aftercare initiation (p < 0.001; difference 65.2 percentage points, 95% CI: 37.1–81.2). Patients who relapsed within the first month (n = 8) or attended external programmes only (n = 11) were excluded from this analysis. Participants who died during follow-up (n = 4) were included only in the landmark survival analysis.

Quality of life and its association with abstinence

Quality of life, as measured by the WHOQOL-BREF total score, improved significantly at both the 6-month and 12-month follow-ups compared with baseline (all p < 0.001; Fig. 2a). Better quality of life at the 6-month follow-up was associated with a longer time to first relapse (p = 0.009, relapse occurrence decreasing by 3.0%, 95% CI: 0.8–5.3%, with each WHOQOL-BREF score point gained), as well as with continuous abstinence throughout the one-year follow-up (p = 0.004; Fig. 2b), and with point abstinence at the 12-month follow-up (p = 0.031). No such association was observed for quality of life at the 12-month follow-up. Patients with repeated previous treatment episodes showed smaller improvements in quality of life compared with first-time treated patients (p = 0.015; difference of median change 9.5 points, 95% CI: 0.5–21; Fig. 2c).

Discussion

Continuous abstinence, early relapse risk and mortality

At the 12-month follow-up, just over one third of the patients achieved continuous abstinence, while nearly one half remained abstinent when patients reporting a single lapse during the study period were also included. These findings are in line with the results of our earlier work reviewing available Czech studies on the effectiveness of medium-term inpatient treatment for alcohol-dependent patients, which found one-year abstinence rates ranging from 34% to 60% (Skorkovský et al., 2023).

Because most of the relapses observed in this study occurred within the first 6 months after discharge, this period can be considered a particularly vulnerable phase of recovery. This temporal asymmetry is consistent with previous research findings (Dawson et al., 2007; Rolová

et al., 2023; Tibenská et al., 2008) and likely reflects the challenges that patients face when transitioning from a protected inpatient setting to everyday environments associated with conditioned alcohol cues, distress, and reduced external structure. This interpretation is consistent with contemporary evidence showing that cue reactivity and craving play an important role in return to substance use and relapse processes (Vafaie & Kober, 2022), as well as with findings that alcohol craving predicts relapse after residential treatment (Stohs et al., 2019). From a clinical perspective, our findings support the view that the first post-discharge months should be regarded as a critical intervention window, requiring close monitoring and rapid access to continuing care after discharge.

This interpretation is further supported by the observed association between early aftercare initiation and more favourable abstinence outcomes. Patients who initiated aftercare within the first month after discharge showed a significantly longer time to relapse and substantially higher rates of point abstinence at the 12-month follow-up compared to those who did not initiate aftercare. Similar findings have been reported in previous studies highlighting the importance of continuing care following inpatient treatment, whether in the form of aftercare groups, specialist addiction services, individual psychotherapy, or self-help groups such as Alcoholics Anonymous (Blevins et al., 2017; McKellar et al., 2003; Rolová et al., 2023; Tibenská et al., 2008). In the present study, the analysis focused specifically on aftercare groups provided by the same treatment facility, as this allowed precise determination of whether and when participation was initiated. Nevertheless, only about one third of patients in our sample initiated this form of structured aftercare, while approximately half did not engage in any continuing care after discharge.

Even though the one-month landmark approach employed in this analysis mitigates the potential immortal time bias by separating the time window for initiating aftercare from the subsequent observation period for relapse, the observed association should still be interpreted with caution. Patients who initiate aftercare may differ systematically from those who did not, which may partly contribute to their higher likelihood of achieving continuous abstinence. Previous research suggests that treatment engagement and retention are shaped by a complex interplay of motivational, clinical, and contextual factors, including readiness to change, perceived treatment relevance, social stability, and the quality of the therapeutic relationship (Brorson et al., 2013; Zemore et al., 2021). The observed association between early aftercare initiation and more favourable outcomes should therefore not be interpreted causally, but rather as part of a broader process of treatment engagement and recovery.

The mortality observed during follow-up further underscores the clinical significance of relapse. In the present sample, four patients (6.5%) died within one year after the treatment, and in all cases death was preceded by relapse. Similar findings were reported by Tibenská et al. (2016), who in a five-year follow-up of patients after residential treatment observed 28 deaths (13% of the sample), with only two deaths not preceded by relapse. These observations support the view that relapse should not be conceptualised merely as a failure to achieve continuous abstinence, but rather as a clinically serious event associated with markedly increased health risk and the need for timely intervention.

Severity of dependence, quality of life, and recovery-related outcomes

Our analysis showed that greater severity of alcohol-related problems, assessed by the EuropASI Alcohol domain, was associated with poorer post-treatment outcomes. In particular, higher Interviewer Severity Rating (ISR) scores were significantly associated with a shorter time to first relapse. A similar but only borderline non-significant trend was observed for the Composite Score (CS). Consistent findings were also obtained for categorical abstinence outcomes, where higher severity was associated with lower likelihood of sustained one-year abstinence and point abstinence. These findings are consistent with previous studies indicating that clinically assessed severity is an important correlate of post-treatment outcomes (López-Goñi et al., 2012; Stohs et al., 2019), and that interviewer-based severity ratings may provide stronger predictive validity than composite indicators alone.

In contrast, the self-reported duration of excessive alcohol use was not associated with abstinence outcomes, suggesting that retrospective estimates of drinking history may be less informative for relapse risk than structured assessment of current severity. A weak association was observed between higher mean daily alcohol consumption and shorter time to relapse, which corresponds with previously mixed findings regarding the predictive value of consumption-based indicators (Blevins et al., 2017).

Quality of life, assessed using the WHOQOL-BREF, improved significantly at both the 6-month and 12-month follow-ups compared with baseline levels. This finding supports the view that inpatient treatment is associated not only with changes in substance use behaviour but also with broader improvements in subjective well-being and psychosocial functioning. In line with previous literature, these results reinforce the concept of quality of life as an important recovery-oriented outcome in alcohol use disorder (Andersson & Nordfjærn, 2020; Carlon et al., 2022; Kirouac et al., 2017; LoCastro et al., 2009).

Importantly, better quality of life at the 6-month follow-up was associated with more favourable abstinence outcomes, including longer time to relapse and higher likelihood of sustained abstinence over the one-year follow-

up. In contrast, no significant associations were observed between quality of life measured at the 12-month follow-up and abstinence outcomes. One possible explanation is that early post-discharge quality of life may reflect the degree of psychosocial stabilisation and adaptation to everyday functioning after inpatient treatment, which may in turn support ongoing abstinence. By contrast, quality of life measured at the 12-month follow-up is more likely to represent the overall outcome of the recovery process rather than a predictor of subsequent relapse risk. However, given the exploratory nature of these analyses and the limited sample size, these interpretations should be considered tentative.

Taken together, these findings suggest that baseline clinical severity and early post-treatment quality of life may capture different but complementary aspects of recovery trajectories in alcohol use disorder. While severity appears to primarily reflect vulnerability to early relapse, quality of life may be more closely linked to psychosocial stabilisation during the early recovery period.

Nature of the treatment programme and subjective factors of success

In the Czech Republic, inpatient addiction treatment has historically been influenced by highly structured, regime-based models characterised by hierarchical organisation of the therapeutic environment, fixed routines, and sanction systems. Within this context, the described programme represents a relatively short inpatient format with greater emphasis on psychotherapy, individual goal setting, and active patient cooperation. Rather than relying primarily on external structure and behavioural control, the programme places stronger emphasis on intrinsic motivation, therapeutic engagement, and individualised recovery planning.

This distinction may be relevant when interpreting treatment retention and abstinence outcomes. Previous research has consistently shown that dropout from addiction treatment is common and generally associated with poorer outcomes, although the strength of this association varies across treatment settings and substance use populations (Bottlender & Soyka, 2005; Brorson et al., 2013; Csémy et al., 2012; Haver et al., 2001; Lappan et al., 2019; Stark, 1992). At the same time, treatment retention alone should not be interpreted as a sufficient proxy of treatment effectiveness, as outcomes may partly reflect selective retention of patients who are more able or willing to adapt to programme demands (Dacosta-Sánchez et al., 2022; Kubička & Skála, 1982; Skorkovský et al., 2023).

Contemporary research increasingly conceptualises dropout not as a single event, but as a multifactorial and dynamic process shaped by the interaction of individual, treatment-related, and contextual factors. Qualitative findings suggest that dropout often develops gradually as patients weigh the perceived demands and relevance of treatment against their psychological burden, motivation, and personal circumstances (Ormbostad et al., 2021). This process may involve both more deliberate and more impulsive pathways depending on fluctuations in motivation, situational stressors, and the quality of the therapeutic relationship (Cooper et al., 2023). Broader theoretical models similarly emphasise the role of modifiable factors such as motivation, perceived treatment relevance, structural barriers, and therapeutic alliance, rather than static patient characteristics alone (Csémy et al., 2012; Kubička & Skála, 1982; Sirvent-Ruiz et al., 2025).

From this perspective, engagement in aftercare may represent a continuation of the same motivational and relational processes that influence treatment retention during the inpatient phase. The present findings therefore should not be interpreted as evidence that one inpatient model is universally superior. Rather, they suggest that treatment outcomes may depend on the fit between programme characteristics, patient needs, and continuity of care after discharge. In this context, the heterogeneity of inpatient programmes may facilitate individualisation of care, while at the same time limiting direct comparability of outcomes across treatment settings. The present programme nevertheless suggests that a shorter and less regime-based psychotherapeutic approach may be associated with clinically meaningful outcomes in a selected group of patients.

Strengths and limitations

This study represents one of the few prospective observational studies examining a residential treatment programme for alcohol use disorder in the Czech Republic. Major strengths include the high follow-up rate supported by collateral informants and the use of validated instruments assessing abstinence, relapse, and quality of life (WHOQOL-BREF, EuropASI). Limitations include the relatively small sample size, absence of a control group, and potential selection bias related to voluntary treatment participation. Another limitation is the relatively large number of exploratory analyses in relation to the sample size, although several outcome variables represent alternative operationalisations of the same underlying constructs rather than independent hypotheses. Specifically, continuous abstinence, point abstinence, and time to relapse capture different but complementary operationalisations of recovery rather than fully independent outcomes. The same applies to the use of multiple severity indicators (ISR and CS) within the EuropASI questionnaire. These factors should be considered when interpreting the findings. Nevertheless, the study provides useful data for further evaluation and optimisation of inpatient treatment programmes for alcohol use disorder.

Conclusion

This prospective observational study examined 12-month post-treatment outcomes following a seven-week residential treatment programme for alcohol use disorder. Continuous abstinence at the 12-month follow-up was observed in 37.1% of patients, increasing to 45.2% when single lapses were included. Lower baseline alcohol severity, participation in aftercare, and higher quality of life during the early post-treatment phase were associated with more favourable outcomes, while quality of life improved over time.

The findings highlight the multifactorial nature of recovery in alcohol use disorder and the potential importance of continuing care and multidimensional outcome assessment. However, given the observational design and absence of a control group, causal interpretations cannot be made.

Acknowledgments

This work was supported by the Grant Agency of Charles University (GA UK, Project No. 452122); Specific University Research at Charles University (SVV 260631); the Cooperatio Programme (research area SURG); EXCELES – National Institute for Cancer Research (NICR), Project No. LX22NPO5102, funded by the European Union – Next Generation EU; and the European Regional Development Fund (ERDF), project "Application of Modern Technologies in Medicine and Industry" (CZ.0 2.1.01/0.0/0.0/17_048/0007280).

Conflicts of Interest

The authors do not report any conflict of interest associated with the present study.

Author Contributions

Tomáš Skorkovský: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft, Visualization, Funding acquisition.

Milan Beniš: Investigation, Resources, Writing – review & editing.

Jiří Podlipný: Methodology, Validation, Writing – review & editing.

Petr Hošek: Formal analysis, Software, Visualization, Writing – review & editing.

Michal Miovský: Conceptualization, Methodology, Validation, Writing – review & editing, Funding acquisition.

Jan Vevera: Conceptualization, Methodology, Supervision, Validation, Writing – review & editing.

All authors reviewed and approved the final version of the manuscript.

Generative AI disclosure

Artificial intelligence tools were used exclusively to assist with language editing and manuscript refinement. The use of these tools was restricted to improving clarity, grammar, wording, and stylistic coherence in selected parts of the manuscript. Generative AI was not used for data generation, statistical analysis, interpretation of results, or formulation of scientific conclusions. All AI-assisted contributions were thoroughly reviewed and edited by the authors, who assume full responsibility for the final content.

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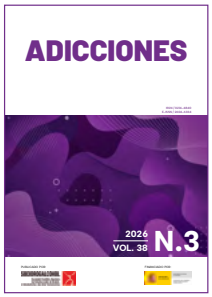
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ADICCIONES
2026 ■ VOL. 38 ■ N. 3 ■ PAGES 199–202
www.adicciones.es



LETTER TO THE EDITOR

Social and family factors associated with accidental exposure to illicit drugs in pediatric patients

Factores sociales y familiares asociados a la exposición accidental a drogas ilícitas en pacientes pediátricos

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Accidental poisoning due to illicit drug exposure in children represents an emerging public health concern whose social dimension has been insufficiently explored in Latin America. In Mexico, more than 70% of pediatric poisoning cases are attributed to medications; however, exposure to illicit drugs remains poorly characterized, particularly with regard to the associated family and social factors (Olguin et al., 2011).

Nevertheless, the prevalence of this problem can be inferred from a study conducted in the emergency department of a hospital in western Mexico between 2016 and 2020, in which 328 cases of poisoning due to various substances were documented among patients younger than 16 years. Of these, 4.8% involved illicit drugs, although the authors did not specify whether all exposures were accidental (Robledo-Aceves et al., 2024).

In this context, we considered it important to share our clinical experience to provide evidence that contributes to a better understanding of this phenomenon from a social perspective. We emphasize that this is an exploratory (pilot) study; nevertheless, the findings highlight the existence of this problem and provide a basis for future, larger-scale investigations.

We conducted a cross-sectional study including patients younger than 15 years who were hospitalized with a diagnosis of accidental poisoning due to illicit drug exposure between January 2021 and January 2025. The study was approved by the institutional Research Ethics Committee, and no information allowing individual patient identification was collected.

Demographic variables, the type of substance involved, and characteristics of the family environment were analyzed, including socioeconomic status, maternal educational level and age, family structure, and living conditions.

Continuous variables were summarized as mean and standard deviation (SD), whereas categorical variables were described as frequencies and percentages.

A total of 18 patients were included, with a mean age of 2.5 years (SD = 2.0). Most cases (88.8%) occurred in older

■ *Received: March 2026; Accepted: May 2026.*

■ ISSN: 0214-4840 / E-ISSN: 2604-6334

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A total of 18 patients were included, with a mean age of 2.5 years (SD = 2.0). Most cases (88.8%) occurred in older infants and preschool-aged children. Amphetamines were the most frequently involved substance (72.2%), followed by opioids (22.2%) and cannabis (5.6%).

From a social perspective, we identified a consistent profile of vulnerability. Overall, 77.8% of the patients belonged to low socioeconomic households, and 83.3% of mothers had only completed basic education. The mean maternal age was 25.3 years (SD = 5.7). In 33.3% of cases, the father was absent from the household. The mean number of household members was 5.3 (SD = 2.5), suggesting overcrowded living conditions. Of particular concern, illicit drug use within the household was documented in 72.2% of cases (Table 1).

Our findings depict an environment characterized by poverty, low maternal educational attainment, vulnerable family structures, and direct exposure to illicit drugs within the home.

Unlike international case series, in which cannabis and opioids are the substances most frequently involved, amphetamines predominated in our sample, possibly reflecting local patterns of drug availability and use (Azkunaga et al., 2017; Oral et al., 2011). This finding highlights the importance of understanding the phenomenon from a regional perspective rather than automatically extrapolating data from other settings.

The age distribution, with a predominance of preschool-aged children and older infants, is consistent with the developmental stage associated with increased exploratory behaviour, greater vulnerability, and a limited ability to recognize potential hazards (Schmertmann et al., 2013; Wood et al., 2018).

The mean maternal age of 25.3 years reflects a profile of young, socially vulnerable mothers, similar to that reported in Spain and the United States (Azkunaga et al., 2017). Lower maternal educational attainment has been inversely

Table 1
Characteristics of patients hospitalized for accidental poisoning due to illicit drug exposure

Characteristics	
Age (years), mean (SD)	2.5 (2.0)
Age group	
1 month to 1 year, n (%)	1 (5.6)
1–2 years, n (%)	6 (33.3)
3–5 years, n (%)	10 (55.6)
6–12 years, n (%)	1 (5.6)
13–15 years, n (%)	0 (0)
Female, n (%)	9 (50)
Type of illicit drug involved	
Amphetamines, n (%)	13 (72.2)
Opioids, n (%)	4 (22.2)
Cannabis, n (%)	1 (5.6)
Socioeconomic status	
Low, n (%)	14 (77.8)
Middle, n (%)	4 (22.2)
High, n (%)	0 (0)
Maternal age (years), mean (SD)	25.3 (5.7)
Maternal educational level	
Basic education, n (%)	15 (83.3)
Upper secondary education, n (%)	3 (16.7)
Father absent from the household, n (%)	6 (33.3)
Household size, mean (SD)	5.3 (2.5)
Illicit drug use within the household, n (%)	13 (72.2)

Note. N=18. SD: Standard deviation.

associated with poisoning risk, likely owing to reduced preventive knowledge and a more limited understanding of the hazards posed by these substances (Olguin et al., 2011).

Paternal absence may be indicative of single-parent family structures, which have been associated with greater social vulnerability and reduced supervision. Likewise, household overcrowding represents a critical risk factor because it limits safe storage spaces and makes continuous supervision of multiple children more difficult (Gallagher et al., 2025).

The high prevalence of illicit drug use within the household is particularly concerning, as it reflects not only the physical availability of these substances but also the normalization of drug use in the presence of children.

From this perspective, accidental poisoning may represent the most visible manifestation of a broader high-risk social environment.

To the best of our knowledge, this is one of the first studies conducted in Mexico to systematically integrate family and social variables in cases of pediatric poisoning due to illicit drug exposure beyond the acute clinical event. Our findings suggest that these poisonings may represent a sentinel marker of social vulnerability and intrafamilial risk.

Although our study has limitations—primarily its small sample size and cross-sectional design—we believe it provides relevant information for both clinical practice and public health.

Conducting studies of this nature is particularly important given the substantial underreporting of these accidental exposures. Such research contributes to documenting their epidemiology, highlighting an important yet preventable cause of morbidity, and providing evidence to support the development of detection and prevention protocols.

Non-stigmatizing screening for parental drug use during pediatric consultations, education on the safe storage of illicit substances, and interventions targeting socially vulnerable families may constitute key preventive strategies.

Accidental poisoning due to illicit drug exposure in children should not be viewed merely as an isolated domestic accident but rather as a phenomenon reflecting social inequalities, adverse housing conditions, and complex family dynamics. Recognizing these events as indicators of social risk may facilitate early, multisectoral interventions aimed at protecting children.

We believe that bringing greater visibility to this issue is essential for the development of context-specific, evidence-based prevention policies.

Conflict of Interest

The authors declare that they have no conflicts of interest.

Author Contributions

According to the CRediT (Contributor Roles Taxonomy), the authors' contributions were as follows:

Tania Esperanza Hernández Tobías: Conceptualization, Methodology, Formal analysis, Investigation, Writing – Original Draft.

Víctor García Olmos: Conceptualization, Validation, Data curation, Software, Supervision, Writing – Review & Editing.

Carlos Sánchez García: Conceptualization, Methodology, Data curation, Formal analysis, Validation, Visualization, Writing – Review & Editing.

Use of Artificial Intelligence

ChatGPT was used solely for grammatical and language editing of the manuscript and was not involved in any other aspect of the study or manuscript preparation.

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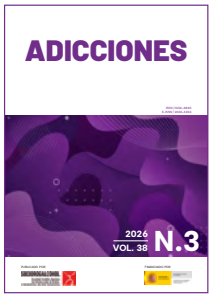
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ADICCIONES
2026 ■ VOL. 38 ■ N. 3 ■ PAGES 203–204
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LETTER TO THE EDITOR

Challenges in the identification of fentanyl and its analogues in Mexico: Implications for public health

Retos en la identificación de fentanilo y sus análogos en México: Implicaciones para la salud pública

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In recent years, fentanyl has gone from being a substance of limited clinical use to becoming an increasingly frequent component of the illicit market. This change has not only altered patterns of consumption but has also introduced new difficulties in its detection and interpretation, particularly in contexts where substances circulate in mixtures and in variable presentations (UNODC, 2023; CDC, 2024).

One of the main complications stems from the constant emergence of fentanyl analogues. These substances exhibit structural variations that can significantly modify their potency and toxicological profile, while at the same time hindering their identification by conventional analytical techniques (Armenian et al., 2018; EMCDDA, 2024). Unlike other drugs with relatively stable compositions, fentanyl and its derivatives form part of a dynamic market in which the substitution and combination of compounds occur rapidly.

In practice, analytical identification is not always a straightforward process. Although techniques such as infrared spectroscopy and chromatography coupled with mass spectrometry remain fundamental tools, their interpretation may be limited when samples contain complex mixtures or adulterants. It is common to find evidence items containing multiple active substances, together with compounds that can mask the analytical signal or modify its interpretation (SWGDRUG, 2021). This situation is of particular relevance in the case of high-potency opioids, where small variations in composition can lead to substantial changes in the risk of overdose (O'Donnell et al., 2020).

Added to this is the difficulty associated with sampling. Under real-world conditions, seized substances are not always homogeneous, so a representative sample may not fully reflect the composition of the whole. This aspect, widely recognized in the forensic field, has direct implications for

■ *Received: April 2026; Accepted: May 2026.*

■ ISSN: 0214-4840 / E-ISSN: 2604-6334

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the interpretation of results and for the estimation of the risk associated with consumption (UNODC, 2009).

From a public health perspective, these analytical limitations have significant consequences. The undetected presence of fentanyl or one of its analogues in other drugs considerably increases the risk for users, who are frequently unaware of the actual composition of what they consume (Ciccarone, 2021). This phenomenon has been documented in different international contexts, where the increase in overdose deaths has been linked to the incorporation of synthetic opioids into various substances (CDC, 2024).

In the Mexican context, some recent reports have noted the complexity associated with the identification of these emerging substances, as well as the variability in their presentation and composition, which reinforces the need to strengthen analytical capacities and surveillance systems (González Lozano et al., 2024).

Furthermore, the speed with which new analogues emerge poses additional challenges in the regulatory sphere. The inclusion of these substances in regulatory lists usually lags behind their appearance on the market, generating temporary gaps that hinder their control. In this scenario, rather than an exclusively regulatory response, a comprehensive approach is required that brings together analytical capacities, epidemiological surveillance, and harm reduction strategies.

Overall, fentanyl and its analogues represent a challenge not only because of their potency but also because of the complexity they introduce in their identification and control. Recognizing these limitations makes it possible to better assess the magnitude of the problem and to move toward more effective responses, in which the information generated in the technical sphere contributes directly to public health decision-making, particularly in a scenario where the rapid evolution of these substances demands technical and coordinated responses.

Conflict of interest

The author declares no conflicts of interest related to the content of this manuscript.

Institutional disclaimer

The views and conclusions expressed in this article are solely those of the author and do not necessarily represent the institutional position of the Fiscalía General de la República.

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GUIDELINES FOR AUTHORS

Adicciones is edited by Socidrogalcohol, Spanish Scientific Society for Studies on Alcohol, Alcoholism and Other Drug Dependencies.

Adicciones publishes original articles in the field of addictions, including publications on treatment, prevention, basic and descriptive studies from different disciplines (medicine, psychology, basic research, social research, etc.). All articles are selected after undergoing an anonymous review process carried out by experts in each topic.

Adicciones publishes 4 issues per year in March, June, September and December. The journal includes five types of publications: editorials, original articles, review articles and letters to the editor.

In order to facilitate reading and avoid possible grammatical errors, references in these guidelines to author and authors, reviewer, reviewers, editor, editors, must be understood as referring respectively to author (male or female), authors (male or female), reviewer (male or female), reviewers (male or female), editor (male or female), editors (male or female).

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The manuscript must include, in a section entitled "Contribution and Authorship," the contribution of each author following the CRediT taxonomy: **https://credit.niso.org/**

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Following the DORA declaration, there is no exact word limit nor limit on bibliographic references for submitted works. Nevertheless, all included information must be strictly necessary, and brevity and conciseness are recommended.

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Works referring to very specific realities or highly particular situations, or that are basically descriptive, will be avoided — unless they are highly novel.

In preparing manuscripts, authors are recommended to follow the reporting guidelines for each type of addiction research from ISAJE: **https://www.isaje.net/reporting-guidelines.html** and the guidelines for research types included in the Equator Network: **https://www.equator-network.org/**

Types of Articles

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As a general rule, editorials are brief manuscripts commissioned by the Editorial Committee from authors or research groups of recognized prestige. Their usual and indicative length is approximately 3,000 words and they are published at the beginning of each issue of the journal.

The main objective of these contributions is to guide, comment on, or reflect upon topics of interest and current relevance for the scientific and professional community. They usually include, concisely, analyses and positions on emerging trends or relevant debates in the field of addictions.

Original Articles

These will preferably be clinical or experimental research works in the field of addictions. Empirical articles with large samples and solid methodologies appropriate to the objectives pursued will be especially valued.

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They will present the update of a topic in a rigorous and exhaustive manner. In general terms, only systematic reviews and meta-analyses will be accepted. These reviews must follow systematized methods (e.g., PRISMA criteria) and be registered in review protocol databases (e.g., PROSPERO).

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They consist of a brief presentation on a particularly novel and original area of research, or a reply or clarification to an article published in the journal. In the latter case, the letter must be received within 10–12 weeks following the publication of the article in the journal issue.

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All authors and co-authors must be registered on the journal platform and their contact details (e.g., email and telephone) must be indicated in the first step of submission to initiate the process.

This is the only method provided for article submission (if you have any doubts or technical problems you may contact **revistaadicciones@socidrogalcohol.org).**

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It must contain the objective of the work, the justification for why it was carried out and its contribution to existing knowledge, the possible audience to whom the study would be directed and its impact on the development of possible new works, as well as a description of the main findings and their contribution to generating new knowledge in the field of addictions.

B) Review document signed by all authors

Every manuscript submitted for consideration for publication in the journal Adicciones must be accompanied by a letter signed by all authors or by the corresponding author with authorization from the other authors.

This document must literally state the following:

Review document signed by all authors

All signatories of the manuscript accept authorship and declare that we have actively participated in the preparation of the manuscript, and that both the draft and the final version have been read and approved by each of us.

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The following information must be indicated, in the order listed here:

- Title of the article, in lowercase (in Spanish and English) except for the initial letter.
- Full name of authors (not only initials), and one or two surnames of the author(s) (e.g., Miguel García or Miguel García Rodríguez or Miguel García-Rodríguez, taking into account that the form used by the authors is the one that will be sent to databases). They must be written in lowercase, except for the initial letter. The different authors must be separated by semicolons. After the surname of each author, without intermediate space and in superscript, an asterisk must appear (1 asterisk for the first, 2 for the second, etc.). These asterisks are necessary to indicate in the next point the affiliation of authors.
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All pages must be numbered consecutively in the upper right-hand corner. The order of presentation followed in the manuscript will be as follows:

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It is advisable to clearly divide the work into sections, following, whenever possible according to the characteristics of the study, the following general scheme: Introduction (however, the word introduction will not be included, as it is assumed), Method, Results, Discussion, Acknowledgements, Conflict of Interest, Contribution and Authorship, and References.

In the case of editorials and letters to the editor, it will not be necessary to include an abstract and the content presented does not need to follow any specific structure.

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It shall be brief and must provide only the explanation necessary for the reader to understand the text that follows. It must not contain tables or figures, unless they are essential for understanding the text. It must include a final paragraph clearly stating the objective or objectives of the work.

Method

The method used must be clearly described (sample selection, how data were collected, data collection or assessment instruments, procedure, etc.). Assessment instruments, treatments, drugs used, apparatus, evaluation systems, statistical tests, etc., must be identified. The type of study (descriptive, epidemiological, experimental, clinical trial, etc.) must be specified.

All submitted works must indicate compliance with the ethical principles necessary to conduct the research and the reference of the ethics committee or research office that evaluated the adequacy of the research within the corresponding ethical and legal framework.

It is important that experimental studies and clinical trials be registered and that the registration number in a trial database (e.g., Clinicaltrials.gov) be indicated, or that the protocol has been previously published in other scientific journals.

The statistical analyses used must be specified. When these are highly novel, they must be described in detail and the statistical package used must be indicated with the appropriate reference.

It is strongly recommended, whenever possible, to indicate the exact significance value obtained in the results (rather than formulas such as $p < .05$ or $p < .01$), and also to include, whenever possible, effect size statistics.

Results

Results must be presented in a logical sequence in the text, tables, and figures, and in accordance with the procedure described in the method section.

Only those tables and figures strictly necessary, clearly expressing the results of the study, must be used.

Data must not be duplicated in tables and figures, nor should all data from tables and figures be repeated in the text; only the most important data.

It is advisable to emphasize and summarize only the most important observations.

Randomized clinical trials and experimental designs must comply with CONSORT guidelines (**www.consort-statement.org**), and

studies with non-experimental designs must comply with international guidelines (e.g., STROBE, **https://www.strobe-statement.org/**) to ensure greater clarity in reading and reviewing the work.

Likewise, the corresponding effect size statistics must be presented.

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Discussion

It must begin with the general objective of the study. It will emphasize the new and important aspects of the study and the conclusions derived from it.

The results presented in the previous section or in the introduction must not be repeated in detail.

The most important and controversial aspects must be highlighted and related to other relevant studies on the subject.

Assumptions must not be presented unless supported by data or previous evidence.

When appropriate, recommendations may be included.

The implications of the findings and possible limitations must be indicated (these preferably forming a paragraph at the end of the article).

Acknowledgements

This section will be placed at the end of the article text and just before the Conflict of Interest section.

When considered necessary, persons, centers or entities that collaborated or supported the work will be cited.

All persons who helped in the preparation of the article but not to the extent required to be considered authors may be included.

If the work has been funded, the funding entities, call, and reference of such funding must be indicated, specifying whether it is competitive or not.

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Additionally, it should be stated, where applicable, whether generative intelligence has been used in the preparation and/or review of the manuscript and what tasks have been performed with the support of such intelligence.

References

They must strictly follow the Publication Manual of the American Psychological Association, 7th edition (2020) (**www.apastyle.org**).

Tables and Figures

They must be placed at the end of the text, numbered, and each on a separate page, following APA design.

The location where they should be placed must be indicated in the manuscript text.

Both tables and figures must be submitted in a format that allows modification during the article editing process.

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2026 ■ VOL. 38 ■ N. 3
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PUBLISHED BY:
SOCIDROGALCOHOL
Sociedad Científica Española de Estudios sobre el Alcohol, el Alcoholismo y las otras Toxicomanías

FUNDED BY:
MINISTERIO DE SANIDAD
SECRETARÍA DE ESTADO DE SANIDAD
DELEGACIÓN DEL GOBIERNO PARA EL PLAN NACIONAL SOBRE DROGAS