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# Changes in alcohol consumption during the COVID-19 among first-year university students in Spain, considering the risk of problematic use — UniHcos project

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## ABSTRACT

The aim of this study was to evaluate the possible impact of the COVID-19 pandemic on prevalence rates and self-reported changes in patterns of alcohol use among first-year university students in Spain, considering the risk of problematic alcohol use. A serial cross-sectional study based on the uniHcos project was carried out. Data from 10 518 first-year university students (73.3% female, mean age 19 (SD = 1.6)) collected between 2012 and 2022 were analysed. The evolution of the pooled prevalence rates during the time series was analysed and the risk of problematic alcohol consumption was assessed using the AUDIT. Also, self-reported changes in alcohol use patterns during the pandemic were assessed. According to the results, during the COVID-19 pandemic, the prevalence of alcohol use in the past 30-days was reduced (76.3% in 2019 vs. 63.7% in COVID-19) increasing again in the New Normal period. Thus, a similar pattern in the practice of binge drinking was observed. Regarding the AUDIT score, 21.7% (95%CI 20.9, 22.6) of the students had harmful alcohol consumption, with a higher proportion among males. In the multivariable logistic models, a higher AUDIT score was significantly associated (p-value < 0.001) with being male and living with roommates. According to self-reported changes in consumption patterns during the COVID-19 pandemic, a higher proportion of participants with harmful use reported an increase in alcohol consumption compared to those at low-risk (43% vs 19%). Finally, despite the overall reduction in drinking prevalence during COVID-19, changes were not equal for all students and depended on their previous level of problematic drinking, highlighting that this should be considered in the development of strategies against alcohol use in this population.


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## Introduction

The onset of the COVID-19 pandemic in 2020 led to the imposition of strong restrictive measures to prevent its spread worldwide. In accordance with the legislation (Real Decreto 463/2020; Real Decreto 926/2020) these measures in Spain were divided into two phases. First, the initial phase, known as the "first-lockdown", which covered the first months of the pandemic (March–June 2020), characterised by the stress and anxiety of the novelty, mandatory home lockdown, lack of knowledge, fear, and the beginning of the use of masks. Then, in the second phase (July 2020–May 2021) the measures were lighter, however, there were still curfews, social distancing and the use of masks. After this period, from June 2021, the return to normality began (New Normal period).

These changes could significantly impact the population's lifestyle habits, such as substance use patterns (Schmidt et al., 2021). About this, the changes in alcohol use during the COVID-19 pandemic are of great interest with a particular focus on the university population and especially on the first-year university students. The university stage is a turning point in students' lives as it coincides with the transition into adulthood, greater independence, and different social circles (Locke et al., 2015). Additionally, the start of this stage frequently coincides with the initiation of substance use experimentation (El Ansari et al., 2020) and with the increase in alcohol consumption and risky drinking patterns (Flaudias et al., 2021). Furthermore, the transition from the family home to independent living could be a significant risk factor for alcohol consumption, due to the influence of roommates and the sense of freedom (Moure-Rodríguez et al., 2020).

The *European Health Interview Survey* (EHIS) indicates that Spain is the second most frequent alcohol consumer in Europe (Eurostat, 2021). Among young people in Spain, the *National Survey on Alcohol and other Drugs in Spain* (EDADES) (OEDA, 2022) reported that 62.7% of people aged 15–24 drank alcohol in the past month. Although the legal age for the purchase and consumption of alcoholic drinks in Spain is 18, the average age of onset is 16.5 years. Consequently, by the time students enrol in university, many of them have already engaged in the consumption of alcohol. In addition, this population has been identified as one of the populations with the highest rates of alcohol consumption worldwide (White & Hingson, 2014; Yockey et al., 2020). Early alcohol consumption has been linked to an increased risk for later alcohol dependence, mental and social problems (Isaksson et al., 2019) and the development of severe physical diseases (Messina et al., 2021). Additionally, binge drinking, or heavy episodic drinking, is prevalent among college students (Castañeda et al., 2021), and has been linked to a multitude of adverse outcomes (Valencia Martín et al., 2020). The typical motivations for alcohol consumption among college students include greater social integration, having a good time and a low-risk perception (Mereu et al., 2021). Hazardous drinkers, however, have reasons such as enhancement or coping with negative emotions, social anxiety, depression, alcohol dependence and poor mental health (Bresin & Mekawi, 2021; Messina et al., 2021).

The onset of the COVID-19 pandemic has prompted concerns regarding the potential impact on alcohol use patterns. Social events were significantly reduced, yet alcohol sales remained accessible in Spain. Concurrently, emotional distress and uncertainty increased, representing a risk factor for alcohol use (Clay & Parker, 2020). In this context, some authors have observed an increase in alcohol consumption among university students (Busse et al., 2021; Charles et al., 2021), although the majority of studies have reported a decrease in the overall prevalence of consumption (Babicki, 2022; Bollen et al., 2021; Evans et al., 2021; Gesualdo & Pinquart, 2021; Heradstveit et al., 2022; Tavolacci et al., 2021; van Hooijdonk et al., 2022), mainly attributed to less availability and the reduction of social opportunities (Evans et al., 2021; Gesualdo & Pinquart, 2021). However, the majority of these studies have only considered consumption during the first-lockdown period and have treated this population as a single entity, without differentiating between drinkers' profiles.

Moreover, the research on this topic in Spain is limited. Most studies do not focus on alcohol consumption as the primary objective, but rather on broader changes in health habits, such as physical activity, diet, and the impact of the pandemic on mental health (Lázaro-Pérez et al., 2020; Millán-Jiménez et al., 2021; Romero-Blanco et al., 2020; Ruiz-Zaldibar et al., 2022; Zapata et al., 2022).

A comprehensive examination of the changes in alcohol consumption among first-year university students in Spain is worthy of consideration. Such an investigation could provide insights into how these young individuals respond to unique circumstances and the factors that may influence their patterns of alcohol consumption. Furthermore, the identification of the different profiles of drinkers in the university community would contribute to the design of appropriate strategies and interventions to deal with the problem of alcohol consumption considering the perspective of the COVID-19 pandemic.

In light of the above, the objective of this study was to fill the gap on the effect that the COVID-19 pandemic and the measures imposed may have had on the prevalence and patterns of alcohol consumption among first-year university students in Spain, compared to the previous trends and considering the risk of problematic drinking and the differences by sex.

## Methods

### *Participants and data collection*

A serial cross-sectional study based on the basal questionnaire of the uniHcos project was conducted (Fernández-Villa et al., 2013). The study population were 11485 First-Year university students from eleven Spanish universities who participated between 2012 and May 2022. The uniHcos questionnaire is online and self-administered, with 471 assessable items about lifestyle habits. Since 2020, questions designed to evaluate the impact of the COVID-19 pandemic on these habits were included.

The students were recruited through their university account email. The invitation included information about the project objectives, data use, confidentiality mandatory informed consent and the survey link in the SphinxOnline® platform (v. 4.26, Le Sphinx Developpement, Chavanod, France). The procedure was conducted in accordance with the current data protection regulations and the Code of Ethics of the World Medical Association (Declaration of Helsinki). All ethics committees of the collaborating universities evaluated and approved the project. The students participated voluntarily, without any kind of reward.

For the purposes of analysis, the age range was limited to 17–24 years. Of the initial sample, 973 participants (8.5%) were excluded due to being older than the age indicated. This decision was made in order to ensure that the population was as homogeneous as possible and represented the majority of first-year university students in Spain. The final sample consisted of 10 518 students, 73.3% female, with a mean age (standard deviation) of 19.0 (1.6) years.

The data was classified into three periods as follows: from 2012 to 2019 the surveys were grouped by the year of filling, considering this period as Before COVID-19 period. The second period established was COVID-19 pandemic and it included from the imposition

of the "Alarm State", a period of severe restrictions in Spain, until its repeal (March 2020 to May 2021) according to the legislation (Real Decreto 463/2020; Real Decreto 926/2020). The third period was the New Normal period and it included from June 2021 to May 2022 and is the period of return to normality in most aspects.

In order to analyse changes in self-reported alcohol consumption patterns during the COVID-19 pandemic, this period was divided into two sub-periods: "COVID-19 pandemic (first-lockdown)" (March 2020–June 2020) and "COVID-19 pandemic (not first-lockdown)" (July 2020–May 2021).

### *Study variables*

The prevalence of alcohol consumption at different frequencies was explored, as well as the practice of binge drinking (BD), defined as the consumption of 5 or more drinks for men and 4 or more drinks for women on a single occasion within approximately 2 h (Courtney & Polich, 2009; OEDA, 2022; Vasconcelos et al., 2021). Furthermore, the risk of problematic alcohol use was evaluated using the *Alcohol Use Disorders Identification Test* (AUDIT) (Saunders et al., 1993). This test has been validated for its use in university populations and in an online format (Ballester et al., 2021; Kokotailo et al., 2004). For the analysis two categories were defined: "low risk of problematic use" (score 0–7) and "medium/high risk (hazardous/harmful use)" (score ≥8). For some analysis, the latter category was further subdivided into "medium risk" (score 8–15) and "high risk" (score ≥16), in line with other authors (Killgore et al., 2021; WHO et al., 2001). Covariables such as sex, age and cohabitants were considered.

To investigate the self-perceived changes in drinking patterns during the COVID-19, since the survey sent out in 2020–2021 two questions were included on this topic. One concerning changes during the first-lockdown (COVID-19 pandemic first-lockdown): "During the first-lockdown period, how your alcohol use was in comparison with before the first-lockdown?", and one about the perception throughout the pandemic period (COVID-19 pandemic not first-lockdown): "Since the arrival of COVID-19 in Spain, how was your alcohol use?", with possible answers of both questions being (1) "It has increased", (2) "The use is the same", (3) "The use has decreased", (4) "I'm not an alcohol user.

### *Data analysis*

The pooled prevalence rates of alcohol use and binge drinking for each period and their 95% Confidence Interval (95%CI) were analysed. To identify periods with significant changes in the prevalence trends over the time series, joinpoint regressions models were estimated calculating Annual Percent Changes (APCs). Up to three joinpoints were allowed, and p-values less than 0.05 were considered statistically significant. The "pairwise comparison" option within the software was used to assess whether trends differed significantly between sexes. Furthermore, bivariate and multivariable adjusted logistic regressions were performed to assess the association between the AUDIT score and different variables. A descriptive analysis of the self-reported patterns of alcohol use during the COVID-19 pandemic was also conducted.

To assess statistically significant differences between categorical variables the Pearson's Chi-Square analysis was used. The statistical significance was established at 95% ($\alpha = 0.05$). All analyses were performed using the software STATA 16 (StataCorp., 2019), except for joinpoint regressions that were developed using the Joinpoint Regression Program, Version 5.1.0.0 (Statistical Research and Applications Branch, National Cancer Institute).

## Results

Table 1 shows the socio-demographic characteristics of the sample. Most participants were female (73%) and most of the students used to live with their family (44%) or with roommates/friends (45%).

### *Evolution of prevalence of alcohol use*

According to Fig. 1, throughout the time series, the prevalence of alcohol use ever in lifetime was very high reaching its highest value in 2017 (94.7%). About the past 12-months, the prevalence rates remained stable although the lowest value was found in the COVID-19 period (87.9%). Regarding the past 30-days, a large decrease was observed in the COVID-19 period, where the prevalence dropped to 63.7%, increasing again in the New Normal period (77.8%). A similar pattern was observed with regard to the prevalence of binge drinking in the past 30-days (46.0% in 2019 to 31.3% in COVID-19 and 44.4% in the New Normal).

The results of joinpoint regression models supported these changes, with trend change points identified in COVID-19 and New Normal periods for the prevalence of past 30-days ($APC_{2018\text{-}COVID\text{-}19} = -8.3/APC_{COVID\text{-}19\text{-}NewNormal} = 19.0$) and binge drinking ($APC_{2018\text{-}COVID\text{-}19} = -17.2/APC_{COVID\text{-}19\text{-}NewNormal} = 32.3$), with no significant sex differences observed. In contrast, lifetime and past 12-months prevalence rates showed no change due to the effect of the pandemic, with small trend changes not exceeding an APC of 2.5%. The complete analysis and Annual Percent Changes (APCs) are available in the Supplementary Material 1.

### *Differences in alcohol use prevalences and associated factors according to AUDIT score*

Table 2 shows that 21.7% of the total sample scored ≥8 points in AUDIT with statistically significant differences by sex ($p < 0.001$). In terms of the study period, during the COVID-19 period the percentage of students in the medium/high-risk level decreased from 22.0% in before COVID-19 to 17.7%, increasing again in the New Normal period. Also, according to the multivariable logistic regression model (Table 2), an association was found between being male (aOR = 1.49; p-value < 0.001) and live with roommates (aOR = 1.69, p-value < 0.001) and an increased risk of a positive AUDIT screening, while the COVID-19 period was a protective factor (aOR = 0.74, p-value = 0.007). In bivariate analysis, binge drinking practice in the past 30 days (OR = 10.06) were statistically significant associated ($p < 0.001$) with an AUDIT score of ≥8 points (data not shown).

**Table 1**
Sociodemographic characteristics of the sample (first-year university students), collected between 2012 and 2022 in Spain.

| | n (N = 10 518) | % (95%CI) |
|---|---|---|
| **Sex** | | |
| Female | 7710 | 73.3 (72.5, 74.1) |
| Male | 2808 | 26.7 (25.9, 27.5) |
| **Period of study** | | |
| Before COVID-19 | 9331 | 88.7 (88.1, 89.3) |
| COVID-19 pandemic | 619 | 5.9 (5.4, 6.3) |
| New Normal | 568 | 5.4 (5.0,5 00.8) |
| **People the student lives with** | | |
| Family | 4614 | 43.9 (42.9, 44.8) |
| Roommates/Friends | 4688 | 44.6 (43.6, 45.5) |
| Alone | 856 | 8.1 (7.6, 8.7) |
| Other | 360 | 3.4 (3.1, 3.8) |

Note. Data collection of the periods: Before COVID-19 period: 2012–2019, COVID-19 pandemic: March 2020–May 2021, New Normal period: June 2021–May 2022.

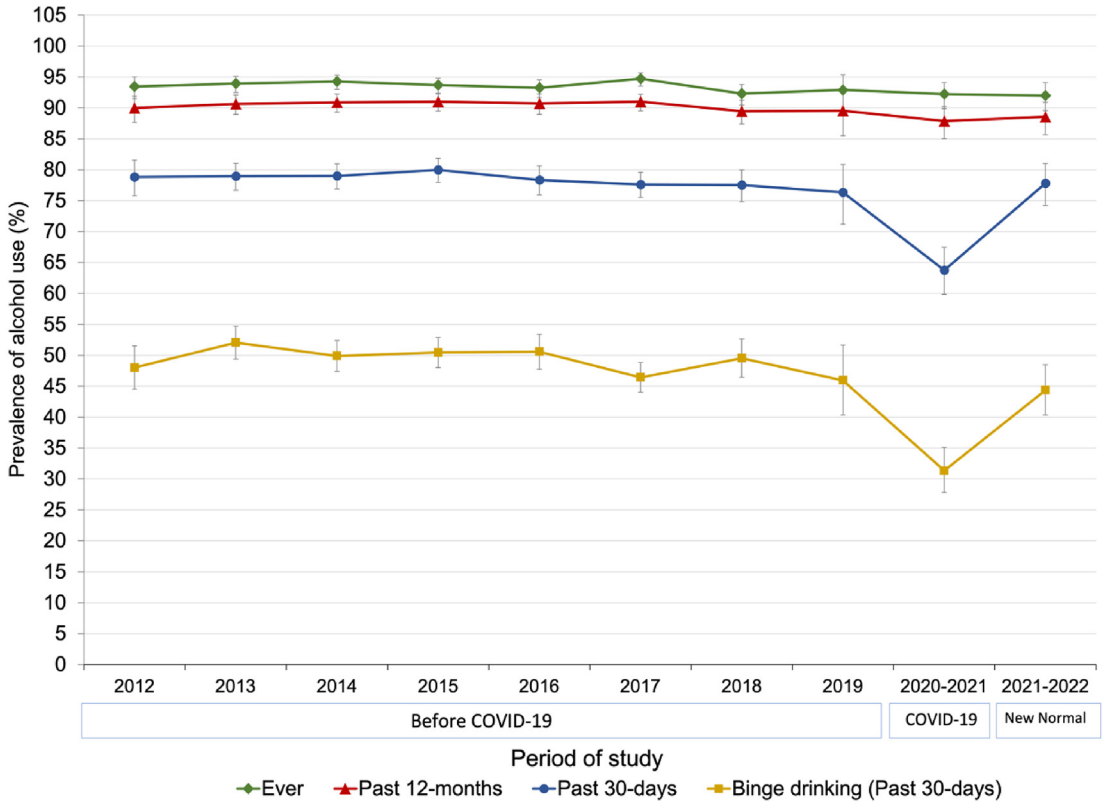


**Fig. 1.** Evolution, from 2012 to 2022, of the prevalence (%) of alcohol use in different frequencies: ever, past 12-months, past 30-days and binge drinking (past 30-days) in first-year university students in Spain. Error bars show the 95%CI.

Upon disaggregating the data on the prevalence of alcohol consumption in the past 30 days by AUDIT score, it was found that the decrease observed during the period of the COVID-19 pandemic was not as pronounced among those with an AUDIT ≥8 (97.2% before COVID-19 to 89.1% during COVID-19) as among those with a low-risk level (73.3%–58.3%) (Supplementary Material 2).

*Changes in the self-reported patterns of use during first-lockdown and all COVID-19 pandemic, by AUDIT score*

According to our findings, of the students who participated after the pandemic (n = 1187) 63.8% reported drinking during the first-lockdown. Among them, 55.9% reported a decrease in their consumption, while 28.1% maintained it and 15.9% increased it. Regarding the changes during all COVID-19 pandemic (not first-lockdown), 72.6% declared alcohol use. Of them, 35.9% decreased their alcohol use, while 38.1% maintained it and 25.9% increased it.

Stratifying the results according the AUDIT score (Fig. 2), during the first-lockdown, the 26.9% of medium/high-risk students reported an increase in alcohol consumption, compared to 11.8% of low-risk students ($p < 0.001$). Similar results were observed in all COVID-19 period. 43.0% of the participants with harmful use increased their consumption compared to 19.8% of those at low-risk ($p < 0.001$).

**Table 2**
Prevalence, bivariate and multivariable logistic regressions for the association of risk of problematic alcohol use (assessed with AUDIT) and different variables. Data from a cross-sectional sample of first-year Spanish university students.

| AUDIT SCORE ≥8 points | | | | | | | |
|---|---|---|---|---|---|---|---|
| Prevalence | | Bivariate | | | Multivariable | | |
| | % (95%CI) | OR | 95%CI | p-value | aOR | 95%CI | p-value |
| **Total** | 21.7 (20.9, 22.6) | – | | | – | | |
| **Sex** | | | | | | | |
| Female | 19.5 (18.7, 20.4) | | | | | | |
| Male | 27.9 (26.3, 29.6) | 1.59 | 1.44, 1.75 | <0.001 | 1.65 | 1.49, 1.82 | <0.001 |
| **Period of Study** | | | | | | | |
| Before COVID-19 | 22.0 (21.2, 22.9) | | | | | | |
| COVID-19 pandemic | 17.7 (14.9, 20.9) | 0.76 | 0.62, 0.95 | 0.013 | 0.74 | 0.59, 0.92 | 0.007 |
| New Normal | 22.0 (18.8, 25.6) | 0.99 | 0.81, 1.22 | 0.993 | 0.92 | 0.74, 1.14 | 0.448 |
| **People they live with** | | | | | | | |
| Parents | 17.0 (16.0, 18.1) | | | | | | |
| Roommates/Friends | 26.8 (25.6, 28.2) | 1.66 | 1.51, 1.83 | <0.001 | 1.69 | 1.53, 1.87 | <0.001 |
| **Age (ref=17)**[a] | | 0.99 | 0.96, 1.03 | 0.879 | 0.99 | 0.96, 1.02 | 0.592 |

Note. Data collection of the periods: Before COVID-19 period: 2012–2019, COVID-19 pandemic: March 2020–May 2021, New Normal period: June 2021–May 2022. Adjusted logistic regression models by sex, age, period of study and university of procedence.

[a] Mean age (SD) = 19.0 (1.6) years.

For all COVID-19 pandemic, we stratified the analysis in three AUDIT score levels (low, medium, and high, data not shown in the graph) founding that 75.9% (CI95% 57.0, 88.2) of participants at high-risk increased their consumption, 13.8% (CI95% 5.2, 31.9) maintained it and only 10.3% (CI95% 3.3, 28.0) decreased it.

*Changes in the self-reported patterns of use during first-lockdown and all COVID-19 pandemic, by sex*

As observed in Fig. 3, during the COVID-19 (first-lockdown) there was a higher proportion of females reporting reducing their alcohol consumption than males, with statistically significant differences ($p < 0.001$). Regarding the changes during all COVID-19 pandemic (not first-lockdown), there was not statistically significant differences by sex in the change of patterns of use ($p = 0.118$).

## Discussion

The main objective of this study was to explore the possible impact of the COVID-19 pandemic on alcohol consumption among first-year university students in Spain, considering risky drinking and with a 10-year evolutionary perspective. The results indicated that throughout the time series, the lifetime prevalence of alcohol consumption was above 95%, while the prevalence rate in the past 12-months was close to 90%. Both prevalence rates remained stable over time.

However, a significant decrease was observed in the past 30-days frequency of use during the COVID-19 period (76.3% in 2019 vs 63.7% in the COVID-19), with a subsequent increase in the New Normal period. This pronounced decline in alcohol consumption is consistent with prior studies on its use during periods of high restrictions (Del Valle-Vera et al., 2021; Kilian et al., 2022; Manthey et al., 2021; OEDA, 2021). Indeed, the outbreak of the COVID-19 was identified as a protective factor against alcohol consumption, according to other authors (Ruiz-Zaldibar et al., 2022).

Nevertheless, the return to previous levels in the New Normal may indicate that the change was a one-off process and that alcohol consumption is closely related to social context. This behaviour has been observed in other studies (Blumberg et al., 2023). This is also supported by other authors who have identified that the main reason for the decline in alcohol consumption among university students was the reduction in social interaction opportunities (Bramness et al., 2021; Fruehwirth et al., 2021; Jackson et al., 2021). Since this paper presents a 10-year perspective on alcohol use prevalence, the sharp decrease in the past-30 days frequency during the COVID-19 period is of interest. This contrasts with the other frequencies of use, which have remained stable, thus supporting the conclusion that these observed changes can indeed be attributed to the outbreak of the pandemic.

Furthermore, the same phenomenon has been observed in the reduction in binge drinking during the COVID-19 period, which also increased again in the new normal period. This has been observed in similar populations (Bonar et al., 2021; Fruehwirth et al., 2021; Tavolacci et al., 2021), probably because of its character of "context-related habit" too (Vasconcelos et al., 2021). It should be noted that the reduction in this practice has been associated with a reduction in the overall prevalence (Kilian et al., 2021).

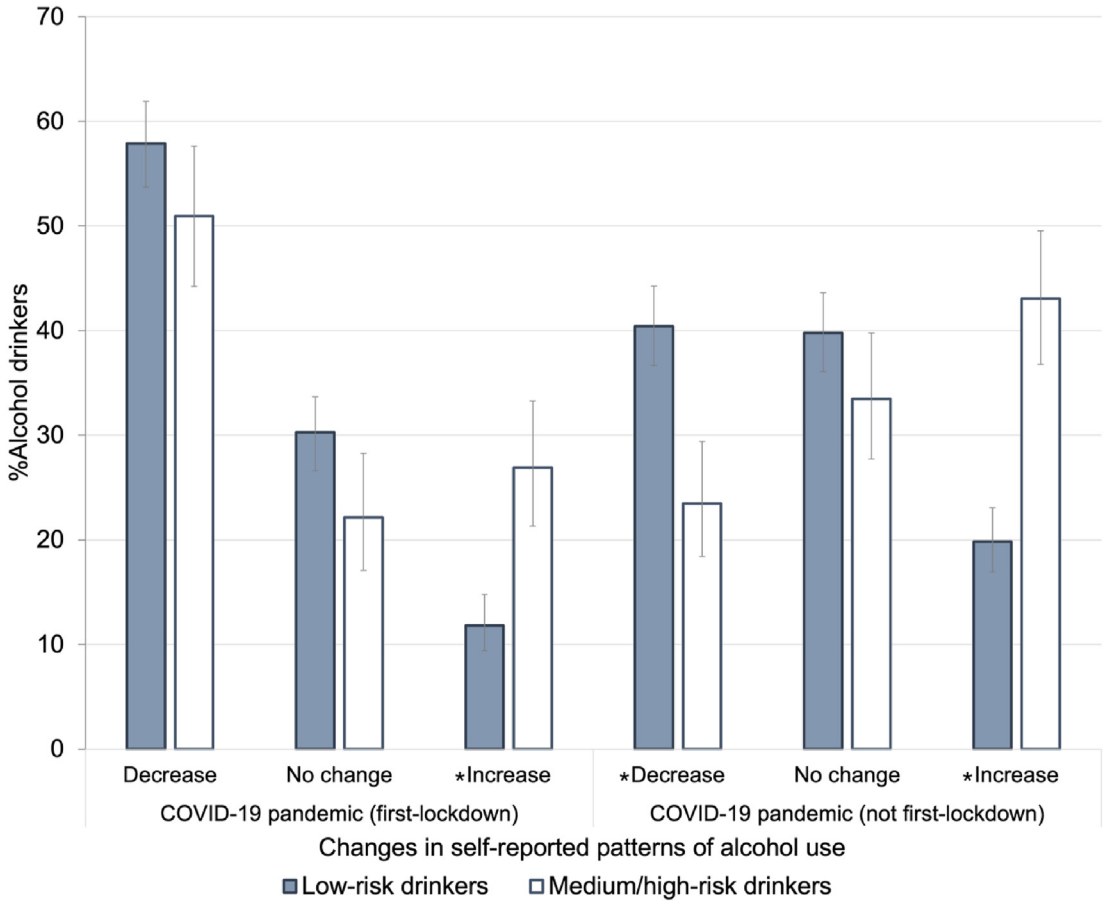


**Fig. 2.** Changes in drinking patterns of first-year Spanish university students during COVID-19 pandemic (first-lockdown) (March 2020–June 2020) and COVID-19 pandemic (not first-lockdown) (July 2020–May 2021), by AUDIT score (cut-off point ≥8). Error bars show the 95%CI. *Show statistically significant differences in patterns.

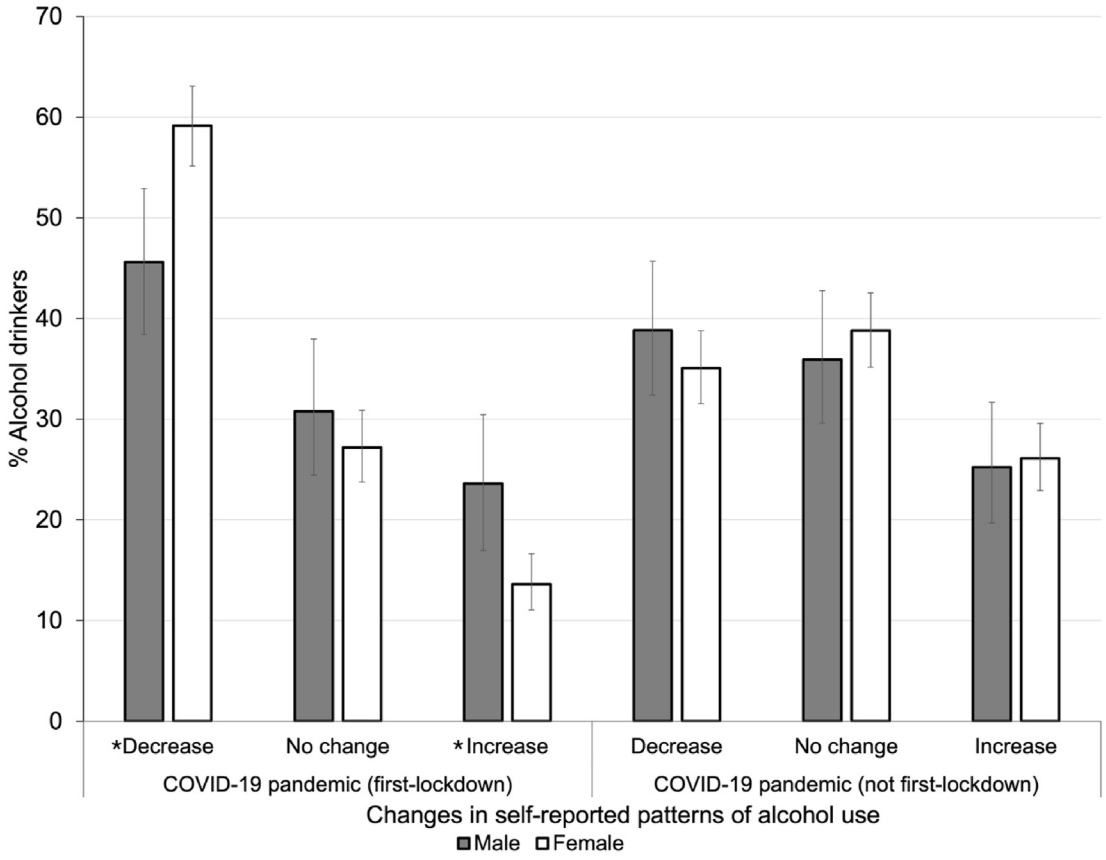


**Fig. 3.** Changes in drinking patterns of first-year Spanish university students during COVID-19 pandemic (first-lockdown) (March 2020–June 2020) and COVID-19 pandemic (not first-lockdown) (July 2020–May 2021), by sex. Error bars show the 95%CI. *Show statistically significant differences in patterns.

On another note, our results highlight that within the university population, the changes during COVID-19 could be related to the profile of the drinker. The percentage of students with medium/high-risk drinking decreased during the COVID-19, increasing again in the New Normal period, as found by other authors (Heradstveit et al., 2022; Kosendiak et al., 2022). The use of the AUDIT questionnaire may explain this, as it refers in four out of ten questions to frequency or quantity consumed, and both parameters were reduced during COVID-19 (Blumberg et al., 2023; Del Valle-Vera et al., 2021; Jaffe et al., 2021).

Despite these results, we observed differences in the pattern of use during COVID-19 pandemic according to the score obtained in AUDIT. A higher proportion of participants in the medium/high-risk category increased or maintained their consumption than in the low-risk category. Moreover, this difference was even more pronounced in the segregated analysis of those at high risk, with various authors also identifying this phenomenon (Chodkiewicz et al., 2020; Matone et al., 2022; Rossow et al., 2021; Schmidt et al., 2021; Wysokińska & Kołota, 2022). This result indicates that when confronted with the similar social changes and stressors, alcohol users do not respond in the same way, and they probably change their consumption in accordance with their previous risk of problematic use. Furthermore, residing away from family was found as a risk factor for a positive AUDIT screening. This finding has been reported by other authors (van Hooijdonk et al., 2022; White et al., 2020; Wicki et al., 2010; Zysset et al., 2022), indicating that the co-living situation should be considered.

It is worth noting that the existing literature has shown strong correlation between an increased risk of problematic use and impaired mental health, or mental health disorders (Chang et al., 2021; Charles et al., 2021; Gavurova et al., 2021; Kenney et al., 2018; Puddephatt et al., 2021), so the strong evidence of worsening mental health among students during COVID-19 (Gogoi et al., 2022; Padrón et al., 2021; Yuan & You, 2022), may support our results.

In addition, no significant differences in the prevalence of alcohol use by sex were found and while variations in patterns were observed during the COVID-19 first-lockdown, they were not in the all COVID-19 pandemic period. The results are in alignment with the current convergence of consumption patterns between men and women, which is attributed to new changes in women's lives. These changes are leading women to consume alcohol in the same way as men in formally egalitarian societies (Holmila & Raitasalo, 2005; Iwamoto & Mui, 2020). However, there were significant differences in risky consumption, with a higher proportion of males. Also, being male was found as a risk factor for problematic drinking, a fact that has been described in the current literature (Aresi et al., 2022; Babicki, 2022; Steffen et al., 2021; Zysset et al., 2022). Nevertheless, despite the narrowing of the overall prevalence by sex, it seems that there are still differences in the risk of problematic use (López-Moreno et al., 2021), which is relevant for future studies.

The results of this study point to the need to implement targeted strategies for university students, given their specific drinking profiles, as not all drinkers have the same patterns. In light of this, it is important to note that strategies aimed at reducing the availability of alcohol on campus may be useful for those at low risk, as it has been suggested that reduced availability may have reduced consumption during COVID-19 (Kilian et al., 2021). However, these strategies may not be sufficient for those who have already

developed a high risk of alcohol consumption, leaving out a large group of students.

For this reason, it would be beneficial to implement strategies such as the one proposed by Benjet et al. (2022) within the Spanish university community. This strategy involves the administration of a brief online survey, which then allows an algorithm to determine each student's risk based on the AUDIT score and other relevant factors, such as those identified in this study (sex, cohabitation and patterns of use). This approach would enable the identification of at-risk first-year students, thereby preventing the emergence of significant future issues.

Previous research has demonstrated that alcohol consumption during the first year of university is predictive of subsequent drinking behaviour (Prince et al., 2019). The capacity to promptly identify at-risk students would permit them to be aware of their level of risk and to be recommended for useful strategies for example face-to-face participation in Brief Alcohol Interventions (BAIs) with evidence (Hennessy et al., 2019), as well as assistance and mitigation guidelines, such as Protective Behavioural Strategies (PBS) (Linden-Carmichael et al., 2019).

Despite the meaningful findings provided, this study is not without limitations. First, the limitations of a cross-sectional study design prevent us from providing causality. Secondly, data collection was obtained by a self-administered questionnaire, so self-reported consumption data is a measure with restrictions in generalizability to other populations. Finally, this work also has limitations related to the sample, considering the difference in sample size in some periods and a higher proportion of women in the sample. However, more women are entering university in Spain (56.0%), especially in some fields like health sciences (71.4%) (Ministerio de Universidades, 2022), so it is hoped that this and the disaggregation of data by sex will control for a possible underestimation of men.

## Conclusions

During COVID-19, a reduction in the overall prevalence of past 30-day alcohol consumption and binge drinking was observed. However, there were notable differences in the participants' self-reported changes of drinking patterns according to their previous risk of problem drinking. Thus, those students with a medium/high risk level increased their alcohol consumption to a greater extent during the pandemic. Being male and living without the family were associated with risky drinking. This study highlights that any strategy targeting the university population must consider not only the overall prevalence of alcohol consumption, but also the risk of problem drinking of the students, in order to provide tailored interventions that can be truly effective for students' needs.

## Data availability statement

The datasets analyzed in the current study are available from the corresponding author upon reasonable request.

## Ethics approval statement

The procedure was carried out following current data protection regulations and following the Code of Ethics of the World Medical Association (Declaration of Helsinki of 1975, as revised in 2000). All ethics committees of the collaborating universities evaluated and approved the project. Informed consent was obtained from all patients for being included in the study. The students participated voluntarily, without any kind of reward.

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## CRediT authorship contribution statement

**Lorena Botella-Juan:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **María Morales-Suárez-Varela:** Writing – review & editing, Methodology, Formal analysis, Data curation, Conceptualization. **Carmen Amezcua-Prieto:** Writing – review & editing, Data curation, Conceptualization. **Ramona Mateos-Campos:** Writing – review & editing, Data curation, Conceptualization. **Carlos Ayán-Pérez:** Writing – review & editing, Data curation, Conceptualization. **Antonio José Molina:** Writing – review & editing, Visualization, Supervision, Methodology, Formal analysis, Data curation, Conceptualization. **Rocío Ortiz-Moncada:** Writing – review & editing, Data curation, Conceptualization. **Ana Delgado-Parrilla:** Writing – review & editing, Data curation, Conceptualization. **Gemma Blázquez-Abellán:** Writing – review & editing, Data curation, Conceptualization. **Miguel Delgado-Rodríguez:** Writing – review & editing, Data curation, Conceptualization. **Jessica Alonso-Molero:** Writing – review & editing, Data curation, Conceptualization. **Tania Fernández-Villa:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Project administration, Methodology, Funding acquisition, Formal analysis, Data curation.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.alcohol.2024.06.008.

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