


Changes in Alcohol Intake by Educational Level Among Older Men and Women in Spain During the 21st Century

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Abstract

Background and Objectives: Despite alcohol use being very common in older adults, studies are scarce and suggest alcohol use may be increasing. Furthermore, despite the known relationship between education and alcohol consumption, there is limited evidence of educational differences in older adults. Our objective was to describe trends in alcohol consumption in individuals aged ≥ 65 by sex and educational level in Spain.

Research Design and Methods: In total, 43,157 participants aged ≥ 65 years were drawn from Spain's national health surveys between 2001 and 2020, representing the noninstitutionalized population. The outcomes were various measures of self-reported past-year alcohol intake. Age-standardized rates and negative binomial regression models were used to examine trends and differences in alcohol intake by educational level, sex, and period (2001–2009 vs 2011–2020).

Results: The average daily alcohol intake and prevalence of heavy average drinking ($>20/10$ g/day) decreased over time, especially among men, whereas moderate average drinking remained unchanged or even increased. Alcohol intake increased with increasing educational levels. All drinking measures showed educational inequalities, and these were greater in women than men. The mean amount of drinking showed the greatest inequality, with adjusted prevalence ratio of 2.6 in women and 1.1 in men between university relative to primary education level.

Discussion and Implications: Alcohol intake in older adults decreased over time in Spain for heavy average drinking and average drinking amount, although not for moderate average drinking. Consumption remains highest among the highest educational levels, which may negatively affect health. Programs addressing alcohol consumption among older adults are needed to minimize alcohol-related harm.

Keywords: Alcohol drinking, Epidemiology, Geriatrics, Socioeconomic status

Translational Significance: We assessed the prevalence of moderate (PMD) and heavy drinking (PHD) and the average daily alcohol intake (ADAI) by educational level in the Spanish population aged ≥ 65 between 2001 and 2020. The ADAI and PHD decreased, especially among men, whereas PMD remained unchanged or increased. ADAI increased by educational level. All measures of alcohol consumption showed educational inequalities, although these were greater for women than for men. Despite concerns about increasing alcohol use among older adults, we observed a decrease in Spain. However, PMD and educational inequalities have increased notably among women, although most alcohol policies focus on young people and men.

Background and Objectives

Alcohol is the most frequently consumed drug in older adults aged ≥ 65 . Approximately 65% of older adults report a high-risk intake, defined as exceeding a threshold of average daily intake at least once a week during the last year (Grant et al., 2017). This is worrisome because those over 65 years of age constitute an expanding segment of the population, likely representing 25% of the European population by 2050

(Crome & Rao, 2018; World Health Organization, 2022) and contribute to a high societal, medical, and mortality burden related to alcohol use. Additionally, it is estimated that 25% of all alcohol-attributable deaths occur in individuals aged ≥ 65 (Esser et al., 2020; Ozluk et al., 2022; White et al., 2020).

Moreover, aging can lead to social and physical changes that increase vulnerability to the effects of substance use (Meier & Seitz, 2008). Changes such as slower alcohol metabolism, decreased lean body mass, polypharmacy, and higher risk

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of falls expose older adults to higher health risks associated with alcohol consumption (Sugarmán & Greenfield, 2021; Topiwala & Ebmeier, 2018; White et al., 2023). Additionally, some life events more likely experienced by older adults, such as the death of a loved one, lack of social support, loneliness, isolation, increasing health problems, and sometimes financial struggles, may cause significant stress and can lead to increased alcohol consumption (Choi & Dinitto, 2011; van Gils et al., 2022).

The overall tendency of alcohol intake has declined in Europe over the last three decades (Shield et al., 2016). By contrast, some country-level studies from Europe and the United States suggest rising alcohol use in older adults (Grant et al., 2017; Stelander et al., 2021). However, data on alcohol consumption in adults aged ≥ 65 is scarce, although it often suggests higher quantities and frequency than those aged < 65 (Armstrong-Moore et al., 2018). Additionally, some differences in terms of specific sociodemographic characteristics need to be considered. Several studies have identified a relationship between socioeconomic status and alcohol use (Beard et al., 2019; Katikireddi et al., 2017). In Spain, alcohol consumption has been shown to vary by socioeconomic status and gender in individuals aged < 65 (Donat et al., 2022). Specifically, positive educational gradients in alcohol intake (greater in highly educated people) have been observed in women, even among heavy average drinkers (≥ 10 g/day). By contrast, in men, positive gradients have been noted for low amounts, whereas for higher amounts (≥ 20 g/day), the educational gradient was reversed. However, data on alcohol intake by socioeconomic status in older people is scarce. Studies in other settings focusing on older people have shown that higher socioeconomic status is associated with higher alcohol intake, and higher income is positively associated with moderate and heavy drinking (Bonevski et al., 2014; Platt et al., 2010).

This study aims to describe educational inequalities in various measures of alcohol intake by sex and their evolution over time in older adults in Spain from 2001 to 2020.

Research Design and Methods

Study Population

The study population was 43,157 participants aged ≥ 65 years in the seven editions of the Spanish National Health Survey and the European Health Survey conducted between 2001 and 2020 in Spain. The final sampling frame was people living in main family homes. Institutionalized and homeless persons were excluded from the sample frame. These surveys use a three-stage random sampling design (census tract, main family homes, and individuals), with stratification of census tracts. The sample size per survey edition ranged from 4,000 to 7,000 (Supplementary Table 1). The response rate reached over 90% in all editions, except 2009, 2011, and 2014, where it was 70%. Sample characteristics are available elsewhere; however, notably, the prevalence of depression and anxiety has remained relatively stable over time. In women aged 65 or above, the prevalence of depression has been reported between 14% and 19% and anxiety between 8% and 13%. For men, depression has been reported at 5%–6% and anxiety at 3%–4%. The coexistence of both conditions is common in both sexes. Cognitive decline was assessed in 2017, with prevalence estimates increasing with age, ranging from 24% to 59% in

women aged 65 and above and from 17% to 52% in men (Ministerio de Sanidad, 2024).

Variables and Data Collection

The information was collected through personal interviews (2001) or computer-assisted personal interviews (other survey editions), and exceptionally complemented by telephone interviews (2006). Variables considered were survey year, region of residence (19 categories), age, sex, highest educational level achieved (three categories), frequency (number of days/year), and volume of intake (number of standard units) of five main categories of alcoholic beverages (beer/cider, wine, vermouth/alcoholic aperitifs, fruit liquors, and strong liquors/cocktail spirits), with certain variations between survey editions. More details on the survey's methodology can be found elsewhere (Ministerio de Sanidad, 2024).

Statistical analysis

The main outcome was each participant's average alcohol intake, calculated as the arithmetic mean of the amount of alcohol intake in grams of pure alcohol per day (average drinking amount). Subsequently, we classified each individual's average alcohol intake into moderate average drinking (0.1–19 g/day among men and 0.1–9 g/day among women) or heavy average drinking (≥ 20 g/day among men and ≥ 10 g/day among women), obtaining the prevalence of such categories of average drinking amount. These ranges were selected because previous studies and reviews often fail to differentiate between ex-drinkers and lifelong abstainers, potentially overestimating the health benefits of moderate alcohol consumption. Research indicates that the thresholds for risk should be as low as 20 g of pure alcohol per day for men and 10 g/day for women (Burger et al., 2004; Shield et al., 2017). Therefore, we use the terms “moderate” ($< 20/10$ g/day for men/women) and “heavy” ($\geq 20/10$ g/day for men/women) consumption, as current evidence suggests no level of alcohol consumption is entirely safe.

The average drinking amount in grams was estimated by summing the alcohol from the previously described types of beverages, following a quantity-frequency approach. Given the scarceness of up-to-date empirical data, the amount of alcohol in grams contained in a standard drink of each type of beverage was obtained from previous studies (18), namely 11.4 (wine), 10.9 (beer/cider), 11.8 (vermouth/alcoholic snacks), 10.9 (beer/cider), 11.8 (vermouth/alcoholic aperitifs), 10.0 (fruit liquors), and 16.6 (strong liquors/cocktail spirits). Those amounts of alcohol in such studies in grams were, in turn, calculated by multiplying the volume of a standard drink in milliliters (from clinical or public health guidelines) by the alcohol percent by volume of that beverage (from the Spanish Tax Agency) and by the alcoholic density (0.79).

The outcomes were stratified by survey year or calendar period (2001–2010 and 2011–2020), sex, and educational level. Following the 2011 International Standard Classification of Education (14), the educational level was classified into primary (Levels 0–1), secondary (Level 2), and university education (Levels 3–5). We used educational level as an indicator of socioeconomic position (understood as the “social and economic factors that influence what positions individuals or groups hold within the structure of a society”) instead of occupation or income level because it is more stable over time and less affected by reverse causality (Galobardes et al., 2006).

Table 1. Age-Standardized Values of Three Alcohol Intake Measures Among Older Adults Aged ≥65 by Sex and Educational Level, Spain, 2001–2020

Alcohol intake measures	Men			Women		
	Point estimator	95% CI		Point estimator	95% CI	
Prevalence of moderate average drinking ^a (%)						
University education	46.8	43.4	50.3	28.2	25.3	31.5
Secondary education	45.3	43.1	47.5	25.3	23.9	26.8
Primary education	39.4	38.2	40.5	17.2	16.6	17.8
Total	41.5	40.6	42.5	19.1	18.6	19.7
Prevalence of heavy average drinking ^b (%)						
University education	23.3	21.0	25.9	21.5	18.9	24.3
Secondary education	21.8	20.3	23.3	15.9	14.8	17.1
Primary education	23.5	22.6	24.4	11.5	11.1	12.0
Total	22.9	22.2	23.6	12.9	12.5	13.4
Average drinking amount ^c (g alcohol/day)						
University education	11.5	10.6	12.4	4.0	3.3	4.6
Secondary education	10.8	10.1	11.6	3.2	2.7	3.7
Primary education	10.6	10.0	11.3	1.8	1.5	2.1
Total	11.4	10.9	12.0	2.3	2.0	2.6

Notes: 95% CI = 95% confidence interval. Values were directly standardized using the 2013 European Standard Population weights.

^aPrevalence of average alcohol intake of 0.1–20 g/day in men and 0.1–10 g/day in women.

^bPrevalence of average alcohol intake of >20 g/day in men and >10 g/day in women.

^cAverage alcohol intake in grams/day.

The alcohol outcomes were age-standardized, using 5-year age groups (up to 85+) and the 2013 European Standard Population weights. Subsequently, relative educational inequality in alcohol intake measures was estimated using the ratio of the measure (mean ratios or prevalence ratios [PRs]) at each educational level to the primary education level (reference category). For this, negative binomial regression models with robust variance and log link in the framework of generalized linear models were used, adjusting for the region of residence, survey year, sex, and age group. Additionally, educational inequality of alcohol intake measures was stratified by sex and period (2001–2009 and 2011–2020).

Differences were considered statistically significant if $p < .05$. Analyses were performed using Stata, version 16.1 (Stata Corporation, College Station, TX) and R version 3.6.2. The Instituto de Salud Carlos III review board approved the study proposal and waived the requirement for informed consent. Ethics committee approval was not required.

Results

Sample Description

During the study period, 72.9% of respondents (65 years of age or older) reported some alcohol intake in the last year (men: 84.0%; women: 65.6%). The average drinking amount was 5.9 g/day (men: 11.7 g/day; women: 2.3 g/day). The overall prevalence of heavy average drinking (≥20/10 g/day) was 16.7%. Other sociodemographic sample characteristics can be seen in [Supplementary Table 2](#).

Alcohol Intake Measures by Educational Level

Age-standardized values of the prevalence of moderate average drinking (0.1–20 g/day in men and 0.1–10 g/day in women), the prevalence of heavy average drinking (>20 g/day in men and >10 g/day in women), and average

drinking amount (g alcohol/day) during the entire study period (2001–2020) by sex and educational level are shown in [Table 1](#). Most drinkers aged 65+ at any educational level in Spain had moderate alcohol intake. Thus, moderate average drinking was 1.7–2.1 times greater than heavy average drinking among men and 1.3–1.6 times among women. Among women, the highest values for any of the three measures of alcohol intake analyzed were observed in those with university education and the lowest in those with primary education. However, among men, practically no difference in the prevalence of heavy average drinking was observed between all three educational levels.

Regarding the evolution of alcohol intake measures over time, [Supplementary Table 3](#) shows the values of the measures for the periods 2001–2009 and 2010–2020 by sex and educational level. Between the first and second decade, the prevalence of heavy average drinking decreased in all subgroups of sex and educational level, with the most intense decreases found in men with primary education and the least intense in university women. The prevalence of moderate average drinking increased in all subgroups of sex and educational level, although generally, the increases were small, except in university women. Finally, the average drinking amount declined over time in subgroups, except among women at the university level.

[Figure 1](#) plots the evolution of the age-standardized average drinking amount by sex and educational level. Among men, there was a downward trend of this measure at any educational level until 2009, remaining stable from there on. Before 2006, the highest values appeared in participants with primary education, whereas later, they appeared in people with secondary or university education, although the educational differences were not significant. A slight downward trend was observed among women starting in 2009 at the secondary educational level and stability at other educational levels. It is also notable that starting in 2006, the educational differences

in average drinking amount widened, with the highest values at the university level and the lowest at the primary level.

Educational Inequality in Alcohol Intake Measures

Table 2 shows estimates of adjusted educational inequality on measures of alcohol intake, using primary education as a reference. In men, the prevalence of moderate and heavy average drinking and the average drinking amount increased with educational level, revealing a positive educational gradient. However, the educational inequality was very slight, with the highest PRs for the prevalence of moderate average drinking (PR: 1.12 and 1.18 in secondary and university education, respectively).

The direction of the relative educational inequality in women was the same as in men (positive gradient), although the magnitude of the relative gradient was considerably greater. The largest gradients were observed in average drinking amount, followed by the prevalence of heavy average drinking (PR: 2.60 and 2.09, respectively, at the university level).

Figure 2 shows relative educational inequalities in alcohol intake measures by period and sex. No clear gradient was observed for men during 2001–2009, but consumption generally increased with increasing educational levels (positive gradient) during 2010–2020. A positive educational gradient was observed for women during both periods. However, the

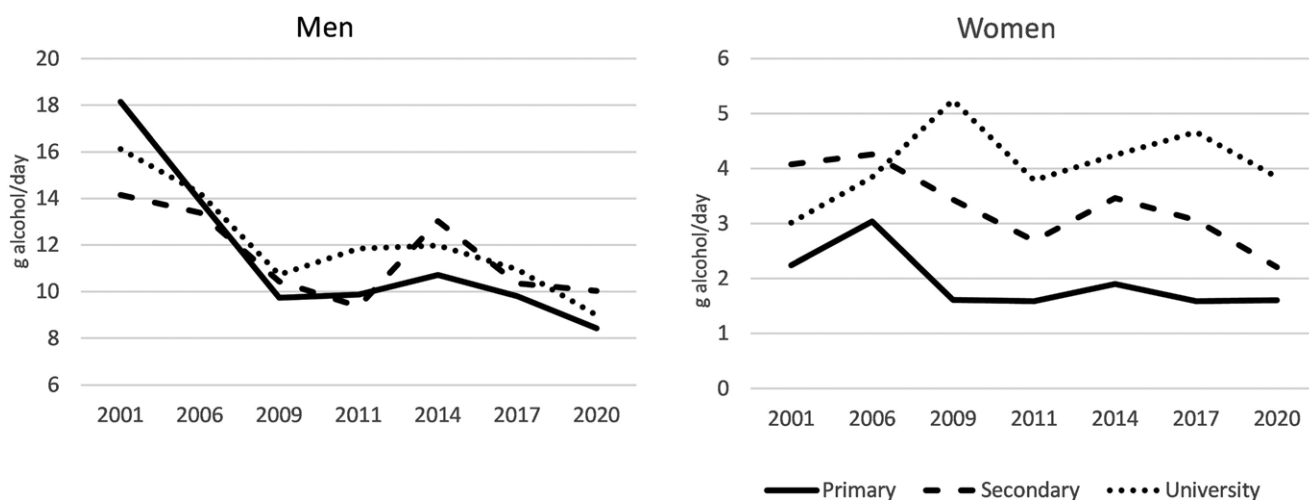


Figure 1. Evolution of age-standardized average drinking amount in people aged ≥ 65 , by sex and educational level, Spain, 2001–2020. Values age-standardized using the 2013 European Standard Population weights and direct methods. Axis scales are different by sex to highlight specific details within each educational subgroup by sex.

Table 2. Educational Inequality in Three Alcohol Intake Measures Among Older Adults Aged ≥ 65 by Sex, Spain, 2001–2020

Alcohol intake measures	Men			Women			
	PR ^d	MR ^e	95% CI	PR ^d	MR ^e	95% CI	
Prevalence of moderate average drinking ^a (%)							
University education	1.18	1.12	1.25	1.58	1.43	1.75	
Secondary education	1.12	1.07	1.17	1.39	1.30	1.48	
Primary education	1.00			1.00			
Prevalence of heavy average drinking ^b (%)							
University education	1.10	1.00	1.21	2.09	1.85	2.35	
Secondary education	1.03	0.96	1.11	1.59	1.46	1.73	
Primary education	1.00			1.00			
Average drinking amount ^c (g alcohol/day)							
University education		1.10	1.03	1.18	2.60	2.32	2.92
Secondary education		1.06	1.01	1.12	1.79	1.65	1.95
Primary education		1.00			1.00		

Notes: 95% CI = 95% confidence interval. Values were age-standardized using the 2013 European Standard Population weights and direct methods.

^aPrevalence of average alcohol intake of 0.1–20 g/day in men and 0.1–10 g/day in women.

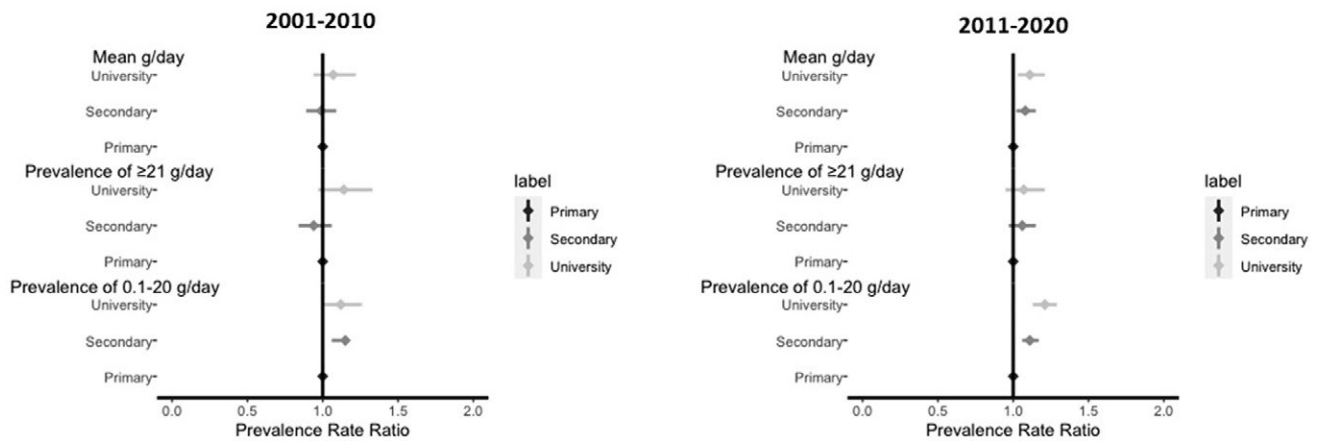
^bPrevalence of average alcohol intake of >20 g/day in men and >10 g/day in women.

^cAverage alcohol intake in g/day.

^dPR: Ratio between the prevalence value at each educational level using the primary education level as the reference, obtained from negative binomial regression models with robust variance and log link in the framework of generalized linear models, adjusting for region of residence, year, sex, and age group.

^eMR: Ratio between the value of average drinking amount at each educational level using the primary educational level as the reference, obtained from negative binomial regression models with robust variance and log link in the framework of generalized linear models, adjusting for region of residence, year, sex, and age group.

Men



Women

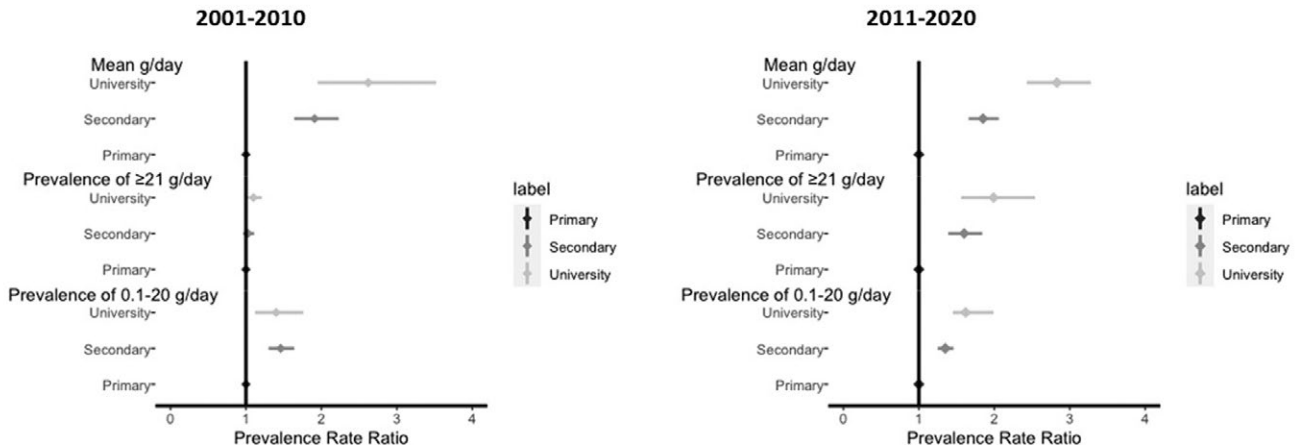


Figure 2. Educational inequality in three alcohol intake measures among older adults aged ≥ 65 by sex and period. Ratios were obtained using negative binomial regression models with robust variance and log link in the framework of generalized linear models, adjusting for region of residence, year, sex, and age group. Ratios between measures at each educational level were obtained using the primary education level as the reference.

gradient became more noticeable during the second period, especially for the prevalence of heavy average drinking and average drinking amount.

Discussion

Main Findings

We provide data on changing patterns in alcohol intake by educational level and sex in older adults in Spain during the 21st century. Between 2001–2009 and 2011–2020, the average drinking amount declined over time in all subgroups of sex and educational level, except in university women. A decrease in the prevalence of heavy average drinking was observed in all subgroups, and an increase in the prevalence of moderate average drinking in all subgroups (more intense in university women). In the entire period, a positive educational gradient was observed in the three alcohol intake measures, with the highest values at the university level and the lowest at the primary level, although the relative educational inequality was considerably greater in women than men. Furthermore, in general, the relative educational inequality increased in 2011–2020 compared with 2001–2009, especially among women and for the prevalence of heavy average drinking.

Heterogeneous Decrease Over Time in Drinking by Educational Level

The results observed may respond to several demographic, socioeconomic, political, and health factors that could affect the distribution of alcohol intake according to educational level and its time evolution. Contrary to other studies suggesting that alcohol use is increasing in older adults (Grant et al., 2017; Stelander et al., 2021), we observed a decline in average drinking amount and the prevalence of heavy average drinking. In addition to the coronavirus disease 2019 (COVID-19) pandemic in 2020, during the study period, two economic phenomena could condition the alcohol outcomes studied; in particular, the economic recession of 2008–2013 (decrease in real per capita income) and the austerity policies of 2013–2018 (improvement of the government’s fiscal balance and reduction of public spending). Although there is some discussion about the effect of recessions and austerity policies on alcohol intake, many researchers accept that it could contribute to reducing the average intake, especially at lower socioeconomic levels, by reducing the purchasing power of the population (Regidor, Mateo, et al., 2019). The economic recession could help partially explain the sharp decline in alcohol intake among the less-educated older adults

after 2008 (Bosque-Prous et al., 2017; Regidor, Albaladejo, et al., 2019). However, the small decrease in alcohol intake among the less-educated older adults during the second decade does not clearly support a favorable effect of austerity policies on alcohol intake, although it is true that between the first and second decades, alcohol intake decreased somewhat more among the less-educated older adults. This could be so because there are other causal paths by which austerity could increase alcohol intake (intensifying people's stress) and, above all because government social spending on older people (mainly directed at paying pensions) was not the object of austerity policies (Martí & Pérez, 2015). In fact, according to the Organisation for Economic Co-operation and Development in Spain, the per head social expenditure (comprising the total cash benefits—such as retirement pensions—direct in-kind provision of goods and services, and tax breaks for social purposes, with “per head” referring to the total amount spent per individual in that group) for old age in 2015 U.S. dollars at constant prices and constant PPPs went from 3,027 dollars in 2013 to 3,535 dollars in 2018 (Organisation for Economic Co-operation and Development, 2024).

Concern About Heavy Average Drinking Consumption, Especially in Highly Educated Women

In any case, the prevalence of heavy drinking in the studied population is high, which undoubtedly negatively affects their health since, although there is controversy about the health effects of light or moderate drinking, most evidence supports that heavy drinking increases the risk of mortality among the older population (Agahi et al., 2016; Ortola, Garcia-Esquinas, Lopez-Garcia et al., 2019). In this context, the resistance to the decrease in alcohol intake among older university women is particularly worrying, where in 2011–2020, the prevalence of heavy average drinking already equaled that of men, defining heavy average drinking as an alcohol intake >20 g/day in men and >10 g/day in women. University women tend to have greater independence and purchasing power than those at other educational levels and surely also broader social networks. These circumstances, together with the change in gender roles, can facilitate their incorporation into alcohol consumption when they are freed from their work and child-rearing responsibilities, especially in a country like Spain with wide availability of alcoholic beverages and a strong tradition of social consumption of alcoholic beverages among the male population. This is troubling because alcohol intake implies more health risks for older adults than for younger individuals because with aging, the tolerance to the acute negative effects of alcohol decreases (which can increase the risk of falls and accidents), and heavy drinking can worsen the prognosis of many chronic pathologies and interact with medications (Topiwala & Ebmeier, 2018; White et al., 2023).

Alcohol-Harm Paradox

The alcohol-harm paradox states that higher alcohol-related mortality is observed at lower socioeconomic levels despite higher consumption at higher socioeconomic levels (Donat et al., 2022; Donat et al., 2023; Grittner et al., 2012; Jones et al., 2015; Makela & Paljarvi, 2008; Probst et al., 2020). A positive socioeconomic gradient of alcohol intake is especially true for the prevalence of drinking any alcoholic beverage and

for the average amount of alcohol intake in a given period (Jones et al., 2015; Katikireddi et al., 2017), whereas often such gradient is inverse for heavy average drinking measures, especially among men, with lower prevalence found at the lowest socioeconomic levels (Batty et al., 2012; Bloomfield et al., 2006; Kuntsche et al., 2006). However, in the present study among older adults aged ≥ 65 , no inverse gradient was observed for any measure, including heavy average drinking in men, and all measures of alcohol intake increased with increasing educational level, although the prevalence of heavy average drinking and average drinking amount increased slightly. This is paradoxical because the opposite was expected since individuals with higher education generally tend to have healthier lifestyles and fewer comorbidities than their less-educated counterparts, which may affect alcohol-drinking behaviors (Davies et al., 2018; Rosoff et al., 2021). In a recent study in Spain, between 2012 and 2019, alcohol-related mortality increased as education level decreased in both sexes, both at working age and older age (Donat et al., 2023). One possible reason that may contribute to explaining this alcohol-harm paradox is selective premature mortality, such that less-educated people would have a higher risk of premature mortality (before age 65) compared with more educated people due to a higher prevalence of heavy drinking and the accumulation of other harms and risk factors. Two recent findings in Spain support this explanation: (a) an inverse educational gradient in the prevalence of heavy average drinking and the prevalence of frequent heavy episodic drinking among men aged 25–64 years (Donat et al., 2023), and (b) a greater inverse educational gradient in alcohol-related mortality at working than older ages (Donat et al., 2023). This last finding has also been reported elsewhere (Siegler et al., 2011; Trias-Llimos & Spijker, 2022). However, the proportion of deaths before the age of 65 is too small for this phenomenon to constitute the only or main explanation.

Health Status and Drinking Behaviors

The hypothesis could also be raised that poorly educated people have a greater cessation or reduction in alcohol intake compared with highly educated people due to health problems related or not to alcohol. The evidence suggests that maintenance of good health and functioning and the absence of major chronic diseases are important factors in continuing alcohol intake among older people and that many older people abandon or reduce such intake due to health or mobility problems (Newson et al., 2012; Ortola, Garcia-Esquinas, Soler-Vila et al., 2019). Evidence also suggests that the prevalence of heavy drinking decreases with age (Holton et al., 2019; Karlamangla et al., 2006), although there are hardly any studies of how this decrease varies according to educational or socioeconomic level in people aged 65. In the only study that included people aged 65+ (approximately 30% of the sample), the educational level did not modify the effect of age on the prevalence of heavy drinking (Karlamangla et al., 2006). There are, however, several studies focused on people aged ≤ 51 years that find that people of low socioeconomic status have a greater probability of transitioning to heavy drinking (Mulia et al., 2017; Puka et al., 2023), although this may not be true for people aged 65+. It is not at all unreasonable to think that older people of lower socioeconomic status may have a greater probability of transitioning from heavy drinking to abstinence or moderate drinking (due to

their poorer level of health) and an equal or lower probability of transitioning from abstinence or moderate drinking to heavy drinking.

Drinking Patterns and Alcohol-Related Harm Inequalities

In this sense, one possibility is that drinking patterns and thresholds, like heavy episodic drinking, may better explain the harm inequalities observed regarding the alcohol-harm paradox compared with alcohol consumption levels. However, these drinking measures were not assessed in our study. Furthermore, our results for older adult men differ from a previous study in Spain among individuals aged 25–64 (Donat et al., 2022), published by our group. In this study, higher alcohol consumption was noted among men with decreasing educational levels, whereas in women, consumption increased with increasing socioeconomic levels. These differences suggest that for men, an inflection in consumption could have likely occurred owing to a cohort-crossover effect related to alcohol consumption, driven by changes in drinking patterns among younger and highly educated men, aligning with the theory of diffusion of innovations (Grittner et al., 2013; Schaap & Kunst, 2009). Another possibility is an increasing intake among younger and lower-educated men, given greater alcohol affordability or more significant financial stress. By contrast, for women, the sustained positive gradients in alcohol use among adults and older adults may indicate a sustained need for specific interventions targeting women. As in the previous study of 25–65-year-olds, the diffusion of innovations theory cannot explain this higher-risk behavior among university women. Another explanation proposed comes from the stress coping theory (Grittner et al., 2013; Lui et al., 2018), according to which women would have higher alcohol consumption to cope with work and social stress, coupled with their greater accessibility and affordability of alcohol due to their greater economy and participation in the labor market. However, this explanation does not seem applicable to this study because older adults aged >64 are unlikely to remain immersed in the work environment. Regardless, reproducing these results in a cohort setting would be relevant to confirm our findings.

Strengths and Limitations

A major strength of our study includes the description of alcohol consumption in older adults, where data are scarce, and the use of a large and nationally representative sample over a long time period. The methodology for each survey's edition was consistent over time, and the alcohol-related questions remained similar, limiting bias regarding questioning and responses. Models assessing educational inequalities were adjusted for various factors such as age, year, gender, and region of residence. Educational level was used as a proxy of socioeconomic position because it is less prone to inverse causality and is more stable over time. Other indicators, such as occupation or income, would have likely been less useful in older adults.

Several limitations of this study can also be noted. Our study is a cross-sectional design, which does not allow causal inferences. Self-reported population surveys greatly underestimate alcohol consumption, especially heavy average drinking (Boniface et al., 2014; Livingston & Callinan, 2015; Sordo et al., 2016). In addition, underestimation may occur because heavy drinkers with a lower educational level are more likely

to refuse the survey. Low-educated women are more likely to conceal some of their drinking due to feelings of guilt or shame (Kydd & Connor, 2015). We did not control for other potential covariates, such as health status, cognitive function, mood disorders, or others. Whereas we categorized alcohol use into “moderate” and “heavy,” we acknowledge that further categorizations would have been useful, although the sample sizes limited further disaggregation. Part of the 2020 survey edition fieldwork took place during the COVID-19 pandemic (Weeks 35–52 of 52 weeks of data collection) and forced changing face-to-face interviews to phone interviews. This could have impacted changes in health, behaviors, and willingness or availability to participate, among others, limiting the validity of the results obtained during the pandemic.

Conclusion

Despite decreasing trends of alcohol consumption in older adults in Spain over the last two decades, moderate average drinking and educational inequalities have increased. Routinely monitoring trends of alcohol consumption in older adults by educational level is needed to inform and prioritize preventive programs tailored to reduce alcohol-related harms. Possibly, in Spain, there has been an excessive focus on alcohol policies for young people and men, which, given these results, must be expanded. Our findings reinforce the need for health providers to assess alcohol consumption in older adults and set proper resources to educate and intervene on the potential risks and harms related to alcohol use, especially among highly educated women.

Supplementary Material

Supplementary data are available at *Innovation in Aging* online.

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Conflict of Interest

None.

Data Availability

Data may be available from the corresponding author (J. Politi) upon reasonable request. This study was not preregistered.

Author Contributions

M. J. Belza and E. Regidor conceived, designed, and acquired the data. M. Donat and J. Politi did the statistical analyses. M. Donat conducted the literature search and wrote the first draft of the manuscript. All authors contributed to the study's analysis and interpretation of data. All authors critically revised the manuscript for important intellectual content and approved the final version.

References

- Agahi, N., Kelfve, S., Lennartsson, C., & Kareholt, I. (2016). Alcohol consumption in very old age and its association with survival: A matter of health and physical function. *Drug and Alcohol Dependence*, 159, 240–245. <https://doi.org/10.1016/j.drugalcdep.2015.12.022>
- Armstrong-Moore, R., Haighton, C., Davinson, N., & Ling, J. (2018). Interventions to reduce the negative effects of alcohol consumption in older adults: A systematic review. *BMC Public Health*, 18(1), 302. <https://doi.org/10.1186/s12889-018-5199-x>
- Batty, G. D., Bhaskar, A., Emslie, C., Benzeval, M., Der, G., Lewars, H., & Hunt, K. (2012). Association of life course socioeconomic disadvantage with future problem drinking and heavy drinking: Gender differentials in the west of Scotland. *International Journal of Public Health*, 57(1), 119–126. <https://doi.org/10.1007/s00038-011-0270-8>
- Beard, E., Brown, J., West, R., Kaner, E., Meier, P., & Michie, S. (2019). Associations between socio-economic factors and alcohol consumption: A population survey of adults in England. *PLoS One*, 14(2), e0209442. <https://doi.org/10.1371/journal.pone.0209442>
- Bloomfield, K., Grittner, U., Kramer, S., & Gmel, G. (2006). Social inequalities in alcohol consumption and alcohol-related problems in the study countries of the EU concerted action ‘Gender, Culture and Alcohol Problems: A Multi-national Study’. *Alcohol and Alcoholism*, 41(Suppl 1), i26–i36. <https://doi.org/10.1093/alcac/agl073>
- Bonevski, B., Regan, T., Paul, C., Baker, A. L., & Bisquera, A. (2014). Associations between alcohol, smoking, socioeconomic status and comorbidities: Evidence from the 45 and Up Study. *Drug and Alcohol Review*, 33(2), 169–176. <https://doi.org/10.1111/dar.12104>
- Boniface, S., Kneale, J., & Shelton, N. (2014). Drinking pattern is more strongly associated with under-reporting of alcohol consumption than socio-demographic factors: Evidence from a mixed-methods study. *BMC Public Health*, 14, 1297. <https://doi.org/10.1186/1471-2458-14-1297>
- Bosque-Prous, M., Kunst, A. E., Brugal, M. T., & Espelt, A. (2017). Changes in alcohol consumption in the 50- to 64-year-old European economically active population during an economic crisis. *European Journal of Public Health*, 27(4), 711–716. <https://doi.org/10.1093/eurpub/ckx044>
- Burger, M., Brönstrup, A., & Pietrzik, K. (2004). Derivation of tolerable upper alcohol intake levels in Germany: A systematic review of risks and benefits of moderate alcohol consumption. *Preventive Medicine*, 39(1), 111–127. <https://doi.org/10.1016/j.ypmed.2003.11.011>
- Choi, N. G., & Dinitto, D. M. (2011). Heavy/binge drinking and depressive symptoms in older adults: Gender differences. *International Journal of Geriatric Psychiatry*, 26(8), 860–868. <https://doi.org/10.1002/gps.2616>
- Crome, I., & Rao, T. *Our invisible addicts*. 2nd ed. Royal College of Psychiatrists. 2018. <https://www.rcpsych.ac.uk/docs/default-source/improving-care/better-mh-policy/college-reports/college-report-cr211.pdf>
- Davies, N. M., Dickson, M., Davey Smith, G., van den Berg, G. J., & Windmeijer, F. (2018). The causal effects of education on health outcomes in the UK Biobank. *Nature Human Behaviour*, 2(2), 117–125. <https://doi.org/10.1038/s41562-017-0279-y>
- Donat, M., Barrio, G., Guerras, J. M., Herrero, L., Pulido, J., Belza, M. J., & Regidor, E. (2022). Educational gradients in drinking amount and heavy episodic drinking among working-age men and women in Spain. *International Journal of Environmental Research and Public Health*, 19(7), 4371. <https://doi.org/10.3390/ijerph19074371>
- Donat, M., Regidor, E., Barrio, G., Ambrosio, E., Sordo, L., Guerras, J. M., & Belza, M. J. (2023). Increase in educational inequalities in alcohol-related mortality in Spain during a period of economic growth. *Addiction*, 118(10), 1920–1931. <https://doi.org/10.1111/add.16264>
- Esser, M. B., Sher, K., Liu, Y., Naimi, T. S., Stockwell, T., Stahre, M., & Brewer, R. D. (2020). Deaths and years of potential life lost from excessive alcohol use—United States, 2011–2015. *MMWR. Morbidity and Mortality Weekly Report*, 69(39), 1428–1433. <https://doi.org/10.15585/mmwr.mm6939a6>
- Galobardes, B., Shaw, M., Lawlor, D. A., Lynch, J. W., & Davey Smith, G. (2006). Indicators of socioeconomic position (part 1). *Journal of Epidemiology and Community Health*, 60(1), 7–12. <https://doi.org/10.1136/jech.2004.023531>
- Grant, B. F., Chou, S. P., Saha, T. D., Pickering, R. P., Kerridge, B. T., Ruan, W. J., Boji, H., Jeon, J., Hwang, Z., Amy, F., Deborah, S. H., & Hasin, D. S. (2017). Prevalence of 12-month alcohol use, high-risk drinking, and DSM-IV alcohol use disorder in the United States, 2001–2002 to 2012–2013: Results from the national epidemiologic survey on alcohol and related conditions. *JAMA Psychiatry*, 74(9), 911–923. <https://doi.org/10.1001/jamapsychiatry.2017.2161>
- Grittner, U., Kuntsche, S., Gmel, G., & Bloomfield, K. (2013). Alcohol consumption and social inequality at the individual and country levels—Results from an international study. *European Journal of Public Health*, 23(2), 332–339. <https://doi.org/10.1093/eurpub/cks044>
- Grittner, U., Kuntsche, S., Graham, K., & Bloomfield, K. (2012). Social inequalities and gender differences in the experience of alcohol-related problems. *Alcohol and Alcoholism (Oxford, Oxfordshire)*, 47(5), 597–605. <https://doi.org/10.1093/alcac/ags040>
- Holton, A., Boland, F., Gallagher, P., Fahey, T., Kenny, R., & Cousins, G. (2019). Life course transitions and changes in alcohol consumption among older Irish adults: Results from the Irish Longitudinal Study on Ageing (TILDA). *Journal of Aging and Health*, 31(9), 1568–1588. <https://doi.org/10.1177/0898264318783080>
- Jones, L., Bates, G., McCoy, E., & Bellis, M. A. (2015). Relationship between alcohol-attributable disease and socioeconomic status, and the role of alcohol consumption in this relationship: A systematic review and meta-analysis. *BMC Public Health*, 15, 400. <https://doi.org/10.1186/s12889-015-1720-7>
- Karlamangla, A., Zhou, K., Reuben, D., Greendale, G., & Moore, A. (2006). Longitudinal trajectories of heavy drinking in adults in the United States of America. *Addiction*, 101(1), 91–99. <https://doi.org/10.1111/j.1360-0443.2005.01299.x>
- Katikireddi, S. V., Whitley, E., Lewsey, J., Gray, L., & Leyland, A. H. (2017). Socioeconomic status as an effect modifier of alcohol consumption and harm: Analysis of linked cohort data. *Lancet Public Health*, 2(6), e267–e276. [https://doi.org/10.1016/S2468-2667\(17\)30078-6](https://doi.org/10.1016/S2468-2667(17)30078-6)
- Kuntsche, S., Gmel, G., Knibbe, R. A., Kuendig, H., Bloomfield, K., Kramer, S., & Grittner, U. (2006). Gender and cultural differences in the association between family roles, social stratification, and alcohol use: A European cross-cultural analysis. *Alcohol and Alcoholism (Oxford, Oxfordshire)*, 41(Suppl 1), i37–46. <https://doi.org/10.1093/alcac/agl074>
- Kydd, R. M., & Connor, J. (2015). Inconsistency in reporting abstinence and heavy drinking frequency: Associations with sex and socioeconomic status, and potential impacts. *Alcohol and Alcoholism (Oxford, Oxfordshire)*, 50(3), 333–345. <https://doi.org/10.1093/alcac/agu106>
- Livingston, M., & Callinan, S. (2015). Underreporting in alcohol surveys: Whose drinking is underestimated? *Journal of Studies on Alcohol and Drugs*, 76(1), 158–164.
- Lui, C. K., Kerr, W. C., Mulia, N., & Ye, Y. (2018). Educational differences in alcohol consumption and heavy drinking: An age-period-cohort perspective. *Drug and Alcohol Dependence*, 186, 36–43. <https://doi.org/10.1016/j.drugalcdep.2017.12.046>
- Makela, P., & Paljarvi, T. (2008). Do consequences of a given pattern of drinking vary by socioeconomic status? A mortality and hospitalisation follow-up for alcohol-related causes of the Finnish Drinking Habits Surveys. *Journal of Epidemiology and Community Health*, 62(8), 728–733. <https://doi.org/10.1136/jech.2007.065672>

- Martí, F., & Pérez, J. (2015). Spanish public finances through the financial crisis. *Fiscal Studies*, 36(4), 527–554. <https://www.jstor.org/stable/26604930>
- Meier, P., & Seitz, H. K. (2008). Age, alcohol metabolism and liver disease. *Current Opinion in Clinical Nutrition and Metabolic Care*, 11(1), 21–26. <https://doi.org/10.1097/MCO.0b013e3282f30564>
- Ministerio de Sanidad. (2024). *Salud y estilos de vida. Estado de salud y determinantes*. <https://www.sanidad.gob.es/estadEstudios/estadisticas/sisInfSanSNS/nivelSalud.htm>
- Mulia, N., Karriker-Jaffe, K. J., Witbrodt, J., Bond, J., Williams, E., & Zemore, S. E. (2017). Racial/ethnic differences in 30-year trajectories of heavy drinking in a nationally representative U.S. sample. *Drug and Alcohol Dependence*, 170, 133–141. <https://doi.org/10.1016/j.drugalcdep.2016.10.031>
- Newson, J. T., Huguet, N., Ramage-Morin, P. L., McCarthy, M. J., Bernier, J., Kaplan, M. S., & McFarland, B. H. (2012). Health behaviour changes after diagnosis of chronic illness among Canadians aged 50 or older. *Health Reports*, 23(4), 49–53. <https://www150.statcan.gc.ca/n1/en/pub/82-003-x/2012004/article/11740-eng.pdf>
- Organisation for Economic Co-operation and Development (OECD). *Social protection and Well-being. Social expenditure aggregates. Old age*. 2024. https://stats.oecd.org/Index.aspx?DataSetCode=SOCX_DET (2024, April 25, date accessed).
- Ortola, R., Garcia-Esquinas, E., Lopez-Garcia, E., Leon-Munoz, L. M., Banegas, J. R., & Rodriguez-Artalejo, F. (2019). Alcohol consumption and all-cause mortality in older adults in Spain: An analysis accounting for the main methodological issues. *Addiction*, 114(1), 59–68. <https://doi.org/10.1111/add.14402>
- Ortola, R., Garcia-Esquinas, E., Soler-Vila, H., Ordovas, J. M., Lopez-Garcia, E., & Rodriguez-Artalejo, F. (2019). Changes in health status predict changes in alcohol consumption in older adults: The Seniors-ENRICA cohort. *Journal of Epidemiology and Community Health*, 73(2), 123–129. <https://doi.org/10.1136/jech-2018-211104>
- Ozlu, P. C. R., Cobb, R., Sylwestrzak, G., Raina, D., & Bailly, E. (2022). Alcohol-attributable medical costs in commercially insured and Medicaid populations. *AJPM Focus*, 1(2), 1000036. <https://doi.org/10.1016/j.focus.2022.100036>
- Platt, A., Sloan, F. A., & Costanzo, P. (2010). Alcohol-consumption trajectories and associated characteristics among adults older than age 50. *Journal of Studies on Alcohol and Drugs*, 71(2), 169–179. <https://doi.org/10.15288/jsad.2010.71.169>
- Probst, C., Kilian, C., Sanchez, S., Lange, S., & Rehm, J. (2020). The role of alcohol use and drinking patterns in socioeconomic inequalities in mortality: A systematic review. *Lancet Public Health*, 5(6), e324–e332. [https://doi.org/10.1016/S2468-2667\(20\)30052-9](https://doi.org/10.1016/S2468-2667(20)30052-9)
- Puka, K., Buckley, C., Mulia, N., Purshouse, R. C., Lasserre, A. M., Kerr, W., Rehm, J., & Probst, C. (2023). Behavioral stability of alcohol consumption and socio-demographic correlates of change among a nationally representative cohort of US adults. *Addiction*, 118(1), 61–70. <https://doi.org/10.1111/add.16024>
- Regidor, E., Albaladejo, R., Mateo, A., de la Fuente, L., Barrio, G., & Ortega, P. (2019). Macroeconomic fluctuations, changes in lifestyles and mortality from diabetes: A quasiexperimental study. *Journal of Epidemiology and Community Health*, 73(4), 317–323. <https://doi.org/10.1136/jech-2018-211464>
- Regidor, E., Mateo, A., Barrio, G., & Fuente, L. (2019). Mortality in Spain in the context of the economic crisis and austerity policies. *American Journal of Public Health*, 109(7), 1043–1049. <https://doi.org/10.2105/AJPH.2019.305075>
- Rosoff, D. B., Clarke, T. K., Adams, M. J., McIntosh, A. M., Davey Smith, G., Jung, J., & Lohoff, F. W. (2021). Educational attainment impacts drinking behaviors and risk for alcohol dependence: Results from a two-sample Mendelian randomization study with ~780,000 participants. *Molecular Psychiatry*, 26(4), 1119–1132. <https://doi.org/10.1038/s41380-019-0535-9>
- Schaap, M. M., & Kunst, A. E. (2009). Monitoring of socio-economic inequalities in smoking: Learning from the experiences of recent scientific studies. *Public Health*, 123(2), 103–109. <https://doi.org/10.1016/j.puhe.2008.10.015>
- Shield, K. D., Gmel, G., Gmel, G., Mäkelä, P., Probst, C., Room, R., & Rehm, J. (2017). Life-time risk of mortality due to different levels of alcohol consumption in seven European countries: Implications for low-risk drinking guidelines. *Addiction*, 112(9), 1535–1544. <https://doi.org/10.1111/add.13827>
- Shield, K., Rylett, M., & Rehm, J. (2016). *Public health gains and missed opportunities. Trends in alcohol consumption and attributable mortality in the WHO European Region, 1990–2014*. World Health Organization. <https://iris.who.int/bitstream/handle/10665/329489/WHO-EURO-2016-4119-43878-61787-eng.pdf>
- Siegler, V., Al-Hamad, A., Johnson, B., Wells, C., & Sheron, N. (2011). Social inequalities in alcohol-related adult mortality by National Statistics Socio-economic Classification, England and Wales, 2001–03. *Health Statistics Quarterly*, (50), 4–39. <https://doi.org/10.1057/hsq.2011.7>
- Sordo, L., Barrio, G., Bravo, M. J., Villalbi, J. R., Espelt, A., Neira, M., & Regidor, E. (2016). Estimating average alcohol consumption in the population using multiple sources: The case of Spain. *Population Health Metrics*, 14, 21. <https://doi.org/10.1186/s12963-016-0090-4>
- Stelander, L. T., Høye, A., Bramness, J. G., Selbæk, G., Lunde, L. H., Wynn, R., & Grønli, O. K. (2021). The changing alcohol drinking patterns among older adults show that women are closing the gender gap in more frequent drinking: The Tromsø Study, 1994–2016. *Substance Abuse Treatment, Prevention, and Policy*, 16(1), 45. <https://doi.org/10.1186/s13011-021-00376-9>
- Sugarman, D. E., & Greenfield, S. F. (2021). Alcohol and COVID-19: How do we respond to this growing public health crisis? *Journal of General Internal Medicine*, 36(1), 214–215. <https://doi.org/10.1007/s11606-020-06321-z>
- Topiwala, A., & Ebmeier, K. P. (2018). Effects of drinking on late-life brain and cognition. *Evidence-Based Mental Health*, 21(1), 12–15. <https://doi.org/10.1136/eb-2017-102820>
- Trias-Llimos, S., & Spijker, J. J. A. (2022). Educational differences in alcohol-related mortality and their impact on life expectancy and lifespan variation in Spain (2016–2018): A cross-sectional analysis using multiple causes of death. *BMJ Open*, 12(1), e053205. <https://doi.org/10.1136/bmjopen-2021-053205>
- van Gils, Y., Dom, G., Dierckx, E., Van Alphen, S. P. J., & Franck, E. (2022). Resilience, depression and anxiety and hazardous alcohol use behaviour among community dwelling older adults. *Aging & Mental Health*, 26(1), 56–64. <https://doi.org/10.1080/13607863.2020.1870211>
- White, A. M., Castle, I. P., Hingson, R. W., & Powell, P. A. (2020). Using death certificates to explore changes in alcohol-related mortality in the United States, 1999 to 2017. *Alcoholism, Clinical and Experimental Research*, 44(1), 178–187. <https://doi.org/10.1111/acer.14239>
- White, A. M., Orosz, A., Powell, P. A., & Koob, G. F. (2023). Alcohol and aging – An area of increasing concern. *Alcohol*, 107, 19–27. <https://doi.org/10.1016/j.alcohol.2022.07.005>
- World Health Organization. (2022). *Older people's health needs supported in WHO European Region, post COVID-19*. <https://www.who.int/europe/news/item/11-07-2022-older-people-s-health-needs-supported-in-who-european-region--post-covid-19> (2024, April 3, date accessed).