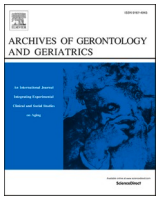
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Specific depressive symptoms are related with different patterns of alcohol use in community-dwelling older adults

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ABSTRACT

Objectives: To explore how individual depressive symptoms might contribute to different patterns of alcohol consumption in Colombian older adults living in the community.
Methods: A Secondary analysis from a nationally representative cross-sectional study of more than 23,000 older adults, with data from 19,004 participants. Drinking frequency, and level (moderate or heavy drinking) were used to assess alcohol use and depressive symptoms explored with the 15 items-GDS., using bivariate and multivariate adjusted regression models.
Results: Lower weekly drinking frequency and a higher number of drinks per serving were associated with total GDS score. For individual symptoms, higher drinking frequency was associated with dropping activities and a preference to stay at home. Lower drinking frequency was associated with low mood, unhappiness, feelings of emptiness, worthlessness, hopelessness, and a lack of vigour. Lower number of drinks per serving was associated with withdrawal/apathy related symptoms; these also related to higher frequency of weekly alcohol consumption.
Higher number of drinks per serving was associated with feelings of emptiness, worthlessness, boredom, helplessness, worthlessness. not wanting to be alive, thinking that other people are better off in their mood, being afraid that something bad will happen and subjective memory problems. Moderate drinkers had a higher likelihood of reporting lack of vigour.
Conclusion: There were diverse patterns of alcohol use according to individual depressive symptoms. This has implications for interventions to reduce alcohol related harm in older people across a range of depressive symptoms with different patterns of alcohol use.

Introduction

Depressive symptoms in later life are present in up to 37% of older people and associated with negative outcomes, such as disability, cognitive impairment, morbidity, social isolation, and death (Rodda, Walker & Carter, 2011). As such, depressive symptoms do not necessarily present as major depression and are often under-detected (Fiske, Wetherell & Gatz, 2009; Kok & Reynolds, 2017; Steffens, 2009).

Risk factors for depression in older age can be divided into physical factors -which include chronic disease, organic brain disease, malignancy, chronic pain, and disability- and psychosocial factors such as isolation and financial circumstances (El-Gilany, Elkhawaga & Sarraf, 2018; Fiske et al., 2009; Schmitz & Brandt, 2019). Depression is also known to be associated with alcohol use, with a possible bidirectional relation (Keyes, Allel, Staudinger, Ornstein & Calvo, 2019). Heavy drinking is associated with co-morbid depression, anxiety, poor social support, and poor self-rated health (Kirchner et al., 2007; Satre, Sterling, MacKin & Weisner, 2011). This association is known to be different according to population, intensity, frequency, and type of alcohol use. The level of alcohol drinking is also determined by cultural standards,

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laws around alcohol, commerce and marketing, access to health and housing as well as economic crisis can also modify alcohol intake on a populational level (Axley, Richardson & Singal, 2019; Blow, Brockmann & Barry, 2004; DANE, 2021; Keyes et al., 2019; Probst, Manthey, Merey, Rylett & Rehm, 2018). Depressive symptoms also vary according to population factors such as education and resource access (Seedat et al., 2009) Alcohol consumption trends are different across regions and change over time (Axley et al., 2019). Information available regarding alcohol consumption has several limitations, including its measurement from self-report. It is estimated that around 25% of global alcohol consumption is not registered and this unregistered proportion is higher in Latin American countries (Axley et al., 2019; Probst et al., 2018). Here, high alcohol use is strongly associated with socio-economic factors. In Colombia for example only 23.3% older adults receive payments from retirement and the largest proportion of the older population depends mainly on their relatives (DANE, 2021), which may influence drinking behaviour.

Excessive alcohol use can be a way of coping with sadness and depression (Bolton, Robinson & Sareen, 2009) but might worsen depressive symptoms that may become treatment resistant (Choi & Dinitto, 2011; Nunes & Levin, 2004). This is even more pronounced in the presence of chronic illness (O'connell, Chin, Cunningham & Lawlor, 2003). Older adults are more sensitive to alcohol related harm and are at higher risk of toxicity due to age-related changes in metabolism, distribution, and clearance (Meier & Seitz, 2008). Alcohol intake in older adults is also associated to falls, delirium, frailty, social isolation, gastrointestinal problems, all-cause mortality, and suicide (Blow et al., 2004; Choi & Dinitto, 2011; Mirand & Welte, 1996; Smith, 1995).

Given the complexity of depressive symptomatology (especially in the absence of major depressive disorder) and the association between depressive symptoms and alcohol use (Rodda et al., 2011) that differ across populations (Axley et al., 2019; Johansson et al., 2021), we aimed to explore the relationship between individual depressive symptoms and drinking levels, type of drink and frequency in community dwelling Colombian older adults. The aim of this cross-sectional study was to explore how different depressive symptoms might contribute to different consumption patterns; this work can help to promote strategies that provide interventions for specific depressive symptoms associated with patterns of alcohol consumption.

Materials and methods

Setting and participants

Participants were drawn from The Health, Well-Being, and ageing (SABE) Colombia study, performed in 2015 with a representative sample of 23,694 community-dwelling Colombian 60-year or older adults were selected to find the factors that characterize ageing in this country. Questionnaires covered socio-demographic characteristics, health-related issues, accessibility to health services, cognitive performance, functional status, and financial resources and were administered to community dwelling participants. Complete methodology, processes and objectives are available elsewhere (Gomez, Corchuelo, Curcio, Calzada & Mendez, 2016) .

Outcomes

The Health, Well-Being, and ageing (SABE) Colombia study assessed alcohol consumption with a multiple choice and an open answer question. The first asks about average weekly consumption during the last month and the second question asks about the number of standard drinks consumed by type of alcoholic beverage (Wine, beer and spirits, or other drinks containing alcohol) during a typical drinking day. (Gomez et al., 2016) A standard drink was defined as containing 14 gs of pure alcohol.

Drinking measures were as follows

1. Frequency was measured by asking 'In the last month, on average, how many days per week have you consumed alcoholic beverages (for example, beer, wine, spirits, or other drinks containing alcohol)?'. Variables were defined as no consumption=0, Less than one day per week= 1, 2 to 3 days a week= 2, 4 to 6 days a week=3, Every day=4
2. Quantity was defined according to the National institutes of Health definition. Moderate drinking was defined as one drink or fewer per day for women, and two drinks or fewer per day for men. Heavy drinking was defined as consuming 4 drinks or more per day for men and 3 drinks or more for women (NIH & NIAAA, 2021).
3. In the last month, on the days you had drinks alcoholic, how many glasses of wine, brandy or beers or other beverages containing alcohol, drank on average per day? This was defined as a continuous variable

Instruments

Depressive symptoms were measured using the 15-question version of the Geriatric Depression Scale (GDS) and used as independent variables This scale has also been validated in Colombian older adults (Bacca AM González A, 2005).

Variables measured as possible confounders were sociodemographic factors such as age in years, gender, completed years of schooling, number of comorbidities - identified through self-report in previous diagnosis by a physician (including Hypertension, Diabetes Mellitus, Cancer, Heart problems, Arthritis, stroke, COPD, osteoporosis); functionality - assessed using the Barthel Index for Activities of Daily Living (BADL)(0 to 100 points) and the Lawton scale for instrumental activities (0 to 6 points), A total BADL score higher than 95 is considered completely independent (Mahoney & Barthel, 1965). A more detailed description of questions is detailed on the survey methodology (Gomez et al., 2016). Total scores with each scale were analysed as continuous variables.

Exclusion criteria

Cognitive impairment was evaluated using the score obtained in the Mini Mental State Examination Modified questionnaire (MMSE-M). Individuals with a total score of less than 13 points required a proxy interview. We excluded subjects who could not complete the survey by themselves and required assistance from a proxy. A total of 19,004 subjects were included in the final sample.

Statistical analysis

We carried a descriptive analysis using relative and absolute frequencies for nominal variables and mean or median for continuous variables. This was followed by a bivariate analysis using chi-square tests for categorical variables and ANOVA test for continuous variables.

GDS items were used as independent variables. Weekly drinking frequency, classification into moderate and heavy drinking and the number of drinks per serving were used as dependant variables.

We performed multivariate models adjusting for confounding variables using zero-inflated Poisson regressions for the variables assessing weekly frequency (0–4) of alcohol consumption. Regressions were reported as incidence rate ratios. Ordinal logistic regression was carried to evaluate number of drinks consumed and reported as an odds ratio. Logistic regression models were fitted for moderate and heavy drinking levels. Multiple testing adjustment was done with Sidak-Holm for p-values. Data was analysed using STATA 16 ® (STATA CORP LLC Texas, USA).

Table 1
Sample characteristics.

	n (%) / Median ± SD
	$n = 19{,}004$
Demographics	
Age	68 (IQR 11)
Sex (f)	10,660 (56.09)
Schooling (years)	3 (IQR 4)
Comorbidities	1 (IQR 2)
Functionality	
Barthel score ≤ 95	2998 (15.78)
Alcohol consumption	2535 (13.44)
Moderate drinking	281 (1.47)
Heavy drinking	1901 (10.00)
Weekly frequency	
Less than 1 day	2050 (10.79)
2–3 days a week	351 (1.85)
4–6 days a week	81 (0.43)
Everyday	71 (0.37)
Type of alcoholic drink	
Wine	163 (5.7%)
Beer	1928 (76%)
Spirit drinks	444 (18.2%)
GDS score	6 (IQR 4)
Not satisfied with life	860 (4.53)
Dropped activities and interests	8645 (45.49)
Feels life is empty	10,259 (53.98)
Feeling bored often	10,939 (57.56)
Not good mood most of the time	1936 (10.19)
Afraid that something bad will happen	10,729 (56.46)
Unhappy most of the time	1710 (9.03)
Feeling helpless	10,464 (55.06)
Prefers to stay at home rather than going out and doing new things	8277 (43.6)
Memory problems	10,769 (56.76)
Thinks it is not wonderful to be alive	425 (2.24)
Feels worthless	11,665 (61.38)
Feels without energy	2.602 (13.73)
Feels hopeless	11,137 (58.6)
Thinks that other people are better	10,113 (53.22)
GDS score	6 (IQR 4)

Ethics

This study is a secondary analysis of the SABE study and was approved by the ethics committees at Pontificia Universidad Javeriana, Bogotá, Colombia. Participants from this study signed informed consents. Our study follows ethical guidelines of Helsinki declaration.

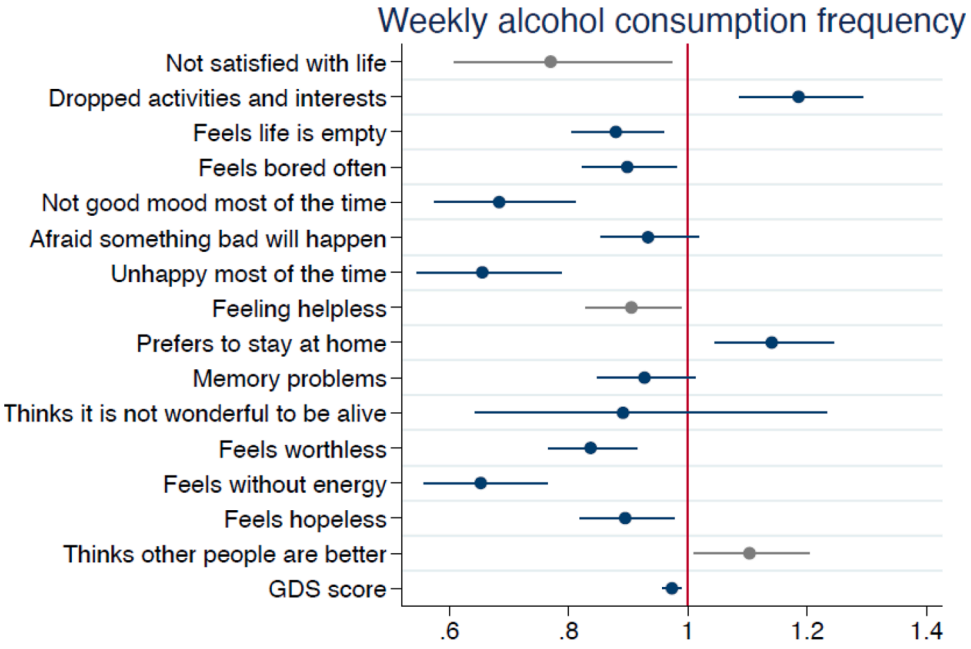
Results

We studied a total of 19,004 people after applying the exclusion criteria. Sample characteristics are shown in Table 1 The median age of the population was 68 (IQR 11), with 10,660 women (56.09%). Median years of education was 3 (IQR 4), and the median number of comorbidities was 1 (IQR 2). 2998 (15.78%) participants had a Barthel score with less than 95 points. 2535 (13.44%) participants reported drinking during the last month. Weekly drinking patterns are shown in Table 1. Moderate drinking was identified in 281 (1.47%) participants and heavy drinking in 1901 (10.00%). The most common pattern of weekly consumption was less than 1 day a week, identified in 2050 (10.79%) participants. Beer was consumed by 1928 (76%) drinkers, followed by spirit drinks and wine consumed by 444 (18.2%) and 163 (5.7%), respectively. Table 1 shows the prevalence of each GDS symptom. Median total GDS score was 6 (IQR 4) The most common items were 'Feels worthless' (61.4%), 'Feels hopeless' (58.6%) and 'Feeling bored' (57.56%).

Lower weekly alcohol consumption frequency was associated with, 'Feels life is empty', 'Feels bored often', 'Not good mood most of the time', 'Unhappy most of the time', 'Feels worthless' 'Feels without energy', 'Feels hopeless' and with total GDS score. Increased weekly alcohol consumption frequency was associated with 'Dropped activities and interests' and 'Prefers to stay at home'. Fig. 1. Table 2.

Feeling without energy was associated with moderate (OR 1.94, CI 1.39–2.69, $p = 0.001$) and negatively with heavy drinking (OR 0.55, 0.40–0.7, $p = 0.015$). Table 2 and Fig. 2.

Number of drinks per serving was associated with 'Feels life is empty', 'Feels bored often', 'Afraid that something bad will happen',



OR odds ratio. (95%CI). Adjusted by age, sex, schooling, Barthel, multimorbidity. Gray plots show variables that lost significance with p-value correction.

Fig. 1. Multivariate ordered logistic regression for frequency of weekly alcohol consumption and GDS
OR odds ratio. (95%CI). Adjusted by age, sex, schooling, Barthel, multimorbidity. grey plots show variables that lost significance with p-value correction.

Table 2
Multivariate analysis GDS symptoms, frequency, and level of consumption.

GDS items	OR (95%CI) p-value*			IR (95%CI) p-value*
	Weekly alcohol consumption frequency	Moderate drinking	Heavy drinking	Number of drinks
Not satisfied with life	0.77 (0.61–0.94) 0.137**	0.72 (0.41–1.27) 0.952	1.17 (0.71–1.92) 0.998	0.96 (0.93–0.98) <0.001
Dropped activities and interests	1.19 (1.09–1.30) 0.014	1.01 (0.83–1.23) 0.999	1.00 (0.84–1.19) 0.999	
Feels life is empty	0.87 (0.80–0.95) 0.027	0.97 (0.79–1.18) 0.999	1.12 (0.94–1.34) 0.927	1.08 (1.04–1.05) <0.001
Feeling bored often	0.88 (0.81–0.97) 0.061	0.85 (0.70–1.04) 0.807	1.22 (1.02–1.46) 0.326	1.12 (1.09–1.15) <0.001
Not good mood	0.66 (0.56–0.79) 0.014	1.36 (0.94–1.98) 0.756	0.76 (0.53–1.07) 0.819	0.92 (0.87–0.97) 0.024
Afraid that something bad	0.92 (0.84–1.01) 0.224	0.94 (0.77–1.15) 0.998	0.98 (0.83–1.18) 0.999	1.05 (1.02–1.08) <0.001
Unhappy most of the time	0.63 (0.53–0.76) 0.014	1.07 (0.71–1.62) 0.999	0.98 (0.67–1.43) 0.999	0.96 (0.90–1.02) 0.534
Feeling helpless	0.90 (0.82–0.98) 0.109**	0.88 (0.72–1.07) 0.999	1.04 (0.87–1.24) 0.999	1.07 (1.04–1.09) <0.001
Prefers to stay at home	1.15 (1.05–1.25) 0.016	1.04 (0.85–1.27) 0.915	0.97 (0.81–1.15) 0.999	0.96 (0.94–0.99) 0.355**
Memory problems	0.92 (0.84–1.00) 0.224	0.96 (0.79–1.17) 0.999	1.04 (0.87–1.24) 0.999	1.08 (1.05–1.08) <0.001
Thinks it is not wonderful to be alive	0.86 (0.62–1.19) 0.371	0.92 (0.43–1.96) 0.999	1.13 (0.57–2.22) 0.999	1.16 (1.05–1.28) 0.012
Feels worthless	0.82 (0.75–0.90) 0.014	0.94 (0.77–1.14) 0.999	1.07 (0.89–1.28) 0.998	1.10 (1.07–1.13) <0.001
Feels without energy	0.63 (0.54–0.74) 0.014	1.94 (1.39–2.69) 0.001	0.55 (0.40–0.75) 0.015	0.81 (0.76–0.85) <0.001
Feels hopeless	0.87 (0.80–0.96) 0.032	1.17 (0.96–1.43) 0.807	0.93 (0.78–1.12) 0.998	0.99 (0.97–1.02) 0.713
Thinks that other people are better	1.10 (1.00–1.20) 0.137 **	0.81 (0.66–0.93) 0.404**	1.12 (0.94–1.34) 0.929	1.05 (1.02–1.07) <0.001
GDS score	0.97 (0.95–0.98) 0.016	0.99 (0.95–1.02) 0.999	1.01 (0.97–1.04) 0.999	1.01 (1.01–1.02) <0.001

IR, incidence rate ratio; OR odds ratio; SD, standard deviation. Adjusted by age, sex, schooling, Barthel, multimorbidity, *Sidak-Holm adjusted p-value. **P-values lost significance with correction.

'Feeling helpless', 'Memory problems', 'Thinks it is not wonderful to be alive', 'Feels worthless', 'Thinks other people are better', and total GDS score (IR 1.01, CI 1.01–1.02, p <0.001). Number of drinks inversely associated with 'Dropped activities and interests', 'Not good mood most of the time' and 'Feels without energy' (Fig. 3, Table 2).

GDS items are displayed on the y axis, x axis shows the calculated OR (odds ratio) for the ordered logistic regression. (95%CI). Adjusted by age, sex, schooling, Barthel, multimorbidity. Grey plots show variables that lose significance with p-value correction.

GDS items are displayed on the y axis, x axis shows the calculated OR (odds ratio) for the logistic regression. OR odds ratio. (95%CI). Adjusted by age, sex, schooling, Barthel, multimorbidity. grey plots show variables that lost significance with p-value correction.

GDS items are displayed on the y axis, x axis shows the calculated IR (incidence rate ratio) for the regression model. (95%CI). Adjusted by age, sex, schooling, Barthel, multimorbidity.

Discussion

In our study, we approached both total GDS score and individual items in relation to alcohol use. Total GDS score was independently associated with a higher number of drinks per serving. However, when studying individual symptoms there were different patterns.

The Geriatric Depression Scale (GDS) score has been used widely for depression screening, with high sensitivity and specificity, (Krishnamoorthy, Rajaa & Rehman, 2020) previous research shows that individual score items have discrepancies according to age and cultural backgrounds (Johansson et al., 2021), some authors have proposed an approach to the GDS based on item categories or dimensions, depending on the type of symptoms, which could in turn reflect different cultural backgrounds and lifestyle behaviours (Adams, 2001; Cheruvu & Chiyaka, 2019; Wongpakaran, Wongpakaran & Kuntawong, 2019). We consider these, could relate in some manner with alcohol drinking trends, depending on the type or dimension of each depressive symptom.

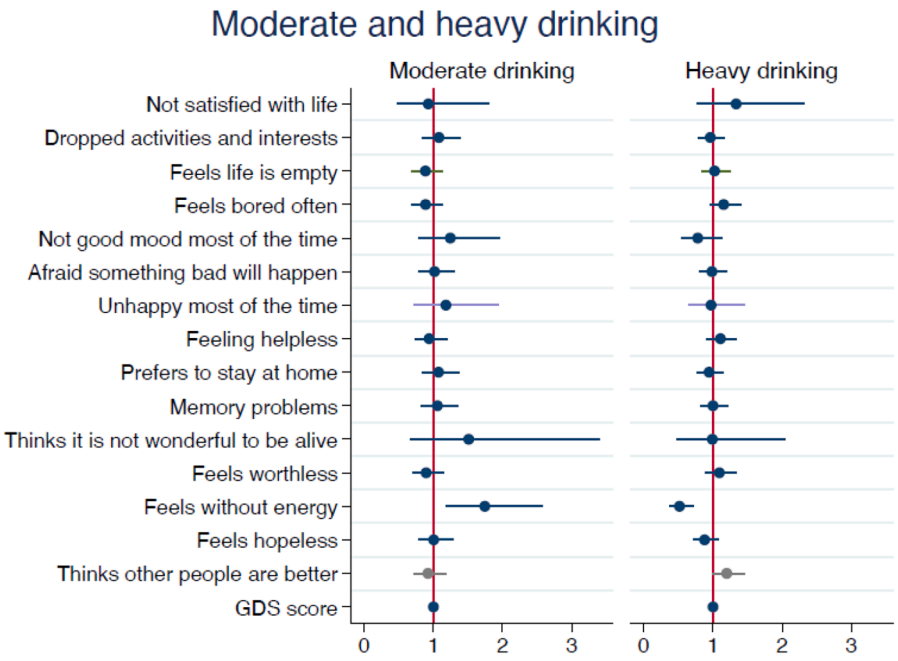
On symptom dimension (Adams, 2001), we found dysphoric symptoms ('Feeling bored often', 'Feels worthless', 'Thinks it is not wonderful to be alive', 'Feels life is empty') to be associated with both a lower frequency of alcohol consumption and a higher likelihood of more drinks per serving. We found the withdrawal ('dropped activities) and apathy ('Prefers to stay at home') (WAV related) symptoms to be associated with a higher frequency of weekly alcohol consumption and a lower average number of drinks per serving. The [Lack of] vigour ('Feeling without energy') symptom was associated with a lower likelihood of heavy drinking, lower frequency of consumption, higher likelihood of moderate drinking and a lower average number of drinks per serving. Having memory problems and anxiety were associated with a higher number of drinks per serving.

Reports regarding a protective effect of moderate alcohol drinking against depression have produced inconsistent results (Bell & Britton, 2015; Bellos et al., 2016; García-Esquinas et al., 2018; Gea et al., 2012; Skogen, Harvey, Henderson, Stordal & Mykletun, 2009). We found moderate drinking to be more likely in those with lower energy levels.

While the association of drinking and depression has been stablished the direction of causality has been controversial (Boden & Fergusson, 2011; Bolton et al., 2009). Alcohol abuse or dependence is known to be associated with an increased risk of major depression (Fergusson, Boden & Horwood, 2009), with such drinking patterns arising from 'self--medicating' to relieve their symptoms (Bolton et al., 2009).

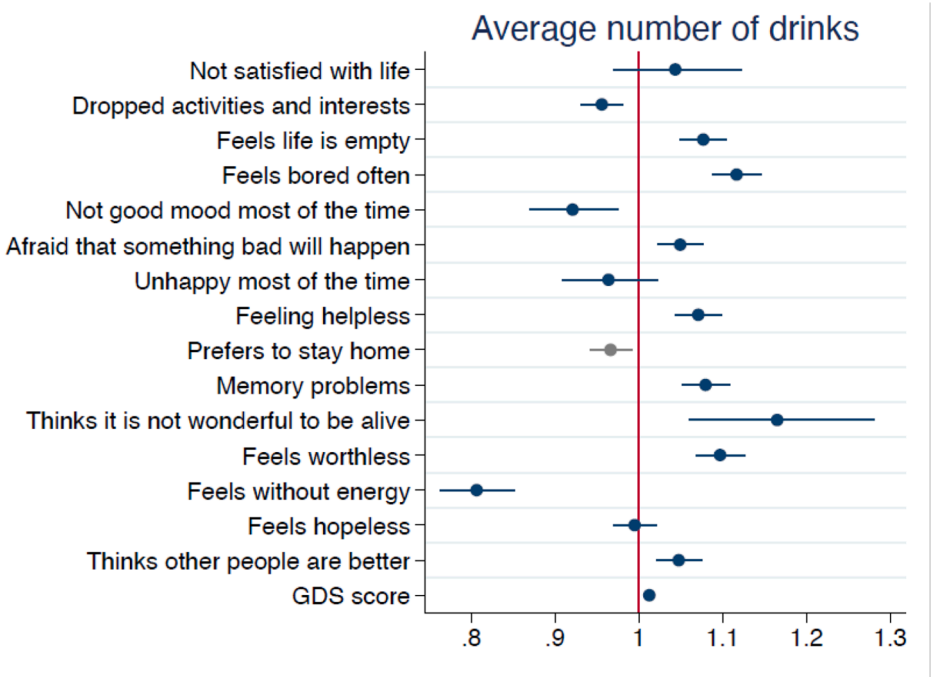
To further explore causality in the association between alcohol consumption and depression, longitudinal studies are necessary (Kok & Reynolds, 2017). Structural equation modelling to assess data from a 25-year longitudinal study in New Zealand showed that the best fitting model used alcohol abuse as a likely causal factor for major depression (Fergusson et al., 2009). A possible explanation for this phenomenon being that social factors may be mediating factors in the relationship between alcohol misuse and depressive symptoms. Furthermore, ethanol exposure produces a reduction in methylenetetrahydrofolate reductase enzyme related to folate metabolism- and lower folate levels are known to be associated with depression. (Boden & Fergusson, 2011) Alcohol abuse in older age also relates with hospital admission by delirium and falls. (Onen et al., 2005)

We found 13% of the sample to consume alcohol at least once during the last month. A higher proportion of women drank wine, and a higher proportion of men drank beer. Wine drinkers were older and had higher educational status. Higher socio-economic status is known to be associated with alcohol misuse (Cagney & Lauderdale, 2002) therefore, people with higher education could have easier access to more expensive beverages with higher alcohol content such as wine, while beer is easier to access at least in this region and therefore more consumed.



OR odds ratio. (95%CI). Adjusted by age, sex, schooling, Barthel, multimorbidity. Gray plots show variables that lost significance with p-value correction.

Fig. 2. Multivariate logistic regression for moderate and heavy drinking and GDS
OR odds ratio. (95%CI). Adjusted by age, sex, schooling, Barthel, multimorbidity. grey plots show variables that lost significance with p-value correction.



IR, incidence rate ratio. (95%CI). Adjusted by age, sex, schooling, Barthel, multimorbidity. Gray plots show variables that lost significance with p-value correction.

Fig. 3. Multivariate zero-inflated Poisson regression for number of alcohol drinks and GDS.
IR, incidence rate ratio. (95%CI). Adjusted by age, sex, schooling, Barthel, multimorbidity. grey plots show variables that lost significance with p-value correction.

A similar study performed in Brazil reported frequent drinking to be more prevalent in men, in line with our results, except for wine drinkers. The most consumed drink was beer, but for each drink the most frequent level of weekly consumption was less than one drink a day (Wolle et al., 2011), also in line with our results. Wine consumption was the least likely alcohol drink to be consumed, contrasting with other countries of

the region, like Chile and Argentina that are traditional wine producers (Ortolá et al., 2017).

Over the last two decades alcohol consumption per capita has decreased in Colombia (WHO & GHO, 2020), according to the WHO (World Health Organization). Beer is the most common alcoholic beverage consumed in the country, reporting 72% prevalence amongst drinkers followed by spirit drinks with 27% and wine by 1% (World Health Organization, 2018). This is consistent with our results, however the older adult population in our study reported a higher prevalence of wine intake by consumers of 5.7%. with a slightly lower spirit drinking prevalence of 19%.

Whether or not depressive symptoms arise from drinking or drinking is used to alleviate depressive symptoms, alcohol consumption screening should be applied to all older adults since alcohol abuse disorders are often undiagnosed, with screening rates lower than 50 percent (Enoch & Goldman, 2002). In addition, the large proportion of unregistered alcohol consumption in Latin America contributes to the underdiagnosis of alcohol consumption disorders with lack of alcohol abuse disorders prevention policies. Older adults with harmful drinking patterns with high number of drinks per serving may present with dysphoric symptoms. Those with WAV symptoms may present with moderate drinking.

Our study has some limitations. Drinking frequency and quantity is known to be under-reported, and in a higher proportion in lower income countries. (Probst et al., 2018) As a cross-sectional study, we could not establish the nature of association between depressive symptoms and drinking, with the possibility of reverse causality. We adjusted our statistical models for general sociodemographic factors, however other social conditions like marital status or social engagement could interact with the drinking behaviour. But were not included to avoid overloading of the statistical models. On the other hand, this study also has several strengths. It is derived from a representative sample of a Latin-American country, where the evidence in this subject is limited and there is a high prevalence of depression and alcohol use. This study is one of the few to address individual depressive symptoms and alcohol drinking in older adults, covering drinking levels, frequency, number of drinks and type of beverage. It also has a large sample size which is enough to reduce the likelihood of a false positive or type 1 statistical error.

Conclusion

There are different patterns of alcohol use according to the presence of the different depressive symptoms.

Lower weekly drinking frequency and a higher number of drinks per serving were associated with total GDS score and dysphoric symptoms were associated with a lower frequency of alcohol consumption but more drinks per serving. We found WAV related symptoms to be associated with a higher frequency of weekly alcohol consumption and a lower average number of drinks per serving. Lack of vigour was associated with a lower likelihood of heavy drinking, lower frequency of consumption, higher likelihood of moderate drinking and a lower average number of drinks per serving. Our findings have considerable relevance to public mental health. Our results are important due to limited existing research on this topic, and due to high rates of Latin American immigrants in other regions. More studies are needed to replicate and improve methods with more detailed surveys regarding alcohol use and longitudinal designs and to establish directionality in the association between the onset of depressive symptoms and changes in drinking habits.

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CRediT authorship contribution statement

Nicolás Castellanos-Perilla: Conceptualization, Writing – original draft, Methodology, Formal analysis, Visualization. **Miguel Germán Borda:** Writing – review & editing. **Sara Cataño:** Writing – original draft. **Salomon Giraldo:** Writing – original draft, Formal analysis. **Audun Osland Vik-Mo:** Writing – review & editing. **Dag Aarsland:** Writing – review & editing. **Rahul Tony Rao:** Writing – review & editing.

Declaration of Competing Interest

None.

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