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Binge drinking and well-being in European older adults: do gender and region matter?

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Background: We aimed to describe gender and region differences in the prevalence of binge drinking and in the association between binge drinking and well-being, among older adult Europeans. **Methods:** This is a cross-sectional study using the Survey of Health, Ageing and Retirement in Europe (SHARE) wave 4, conducted between 2011 and 2012, including 58 489 individuals aged 50 years or older. Sixteen European countries were grouped in four drinking culture regions: South, Central, North and East. We categorized drinking patterns as: never, former, no-binge and binge drinkers. We used the CASP-12 questionnaire to measure well-being. To assess the association between binge drinking and well-being, we fitted two-level mixed effects linear models. **Results:** The highest percentage of binge drinkers was found in Central Europe (17.25% in men and 5.05% in women) and the lowest in Southern Europe (9.74% in men and 2.34% in women). Former, never and binge drinkers had a significant negative association with well-being as compared with no-binge drinkers. There was a significant interaction in this association by gender and region. Overall, associations were generally stronger in women and in Southern and Eastern Europe. The negative association of binge drinking with well-being was especially strong in Southern European women ($\beta = -3.80$, 95% CI: -5.16 to -2.44, P value <0.001). **Conclusion:** In Southern and Eastern European countries the association between binge drinking and well-being is stronger, especially in women, compared with Northern and Central Europe. Cultural factors (such as tolerance to drunkenness) should be further explored.

Introduction

Well-being is a broad construct that captures several important aspects of life and health, including hedonic experience, life evaluation and meaningfulness.[1] Epidemiological studies have demonstrated that positive well-being is closely associated with overall health and have demonstrated the association between positive well-being and decreased mortality and morbidity.[2,3] In addition, studies have found important regional differences in well-being across countries.[4] In Europe, a North–South gradient has been described; with older adults from Northern countries such as the Netherlands or Denmark reporting higher well-being compared with Southern countries like Spain or Italy.[5] The reasons for such gradient are not entirely clear. Although, socio-economic factors could explain this difference, other factors including lifestyle factors such as alcohol consumption may play a role.

To the best of our knowledge, there are few studies examining the association between alcohol consumption and well-being and the results have been inconsistent. Some studies have found that moderate drinking or heavy drinking is associated with better well-being[6] whereas others have found no association or negative impact in well-being.[7,8] The reasons for such inconsistencies are unclear. Cultural differences regarding alcohol consumption have received scarce attention in the literature when it comes to these inconsistencies. In addition, the existing studies have focused on assessing the association between volume and frequency of drinking with well-being, but no study has examined the role of drinking pattern such as binge drinking with well-being among older adults. This is important because emerging evidence suggest that in addition to volume and frequency, drinking pattern may play a role on the harmful effects of alcohol.[9,10]

One of the first categorization of drinking cultures divided Europe into two cultures based on frequency, amount and type of alcohol consumed: 'Wet' (Mediterranean) and 'Dry' (Northern and Anglo-Saxon).[11,12] Such classification, however, fails to capture drinking patterns of Eastern European countries, and other features of drinking culture such as the level of tolerance towards drunkenness, the extent to which drinking occurs more in public vs. private settings, and the cultural norms for perceiving and attributing effects (positive or negative) to alcohol consumption.[13] In an attempt to overcome this limitation and to more comprehensively capture these features, a more nuanced classification divides Europe into four regions: (i) Southern European, characterized by daily alcohol consumption in public places, but low-tolerance to drunkenness; (ii) Northern European, where alcohol is consumed less frequently and mostly in private, but tolerance to public drunkenness is higher; (iii) Central European, a transition between the Southern and Northern cultures with more consumption of alcohol in private settings, but also with low-tolerance to public drunkenness; and (iv) Eastern European countries characterized by heavy drinking.[13,14]

In addition to drinking culture regions, there are gender inequalities within (and across) regions regarding the social and psychological consequences of alcohol consumption.[15,16] The extent to which cultural differences by region influence these gender inequalities in alcohol consumption is unclear. In Eastern and Southern European Mediterranean countries women consume less alcohol than men, but in Central and Nordic countries this gender effect is less clear; those differences or lack of could stem from differences in the role of women in each region.[13,17]

We used data from one of the largest multinational European surveys of older adults (The Survey of Health, Ageing and Retirement in Europe [SHARE]) to: (i) describe gender and region specific differences in the prevalence of binge drinking; (ii) examine the association between binge drinking and well-being; and (iii) examine gender and region specific differences in the association between binge drinking and well-being.

Methods

Study setting

The SHARE is an on-going multinational longitudinal survey of a representative sample of adults aged 50 years or older living in households in several European Countries.[18] The SHARE was designed to include standardized data collection and provide comparable information across European countries. The current analyses are based on information obtained during wave 4 (collected in 2011) of the SHARE project.[19,20] A total of 58 489 individuals from 16 countries completed computer-assisted and self-administered standardized questionnaires on health, socio-demographic data, and well-being. A probabilistic sample was obtained in 16 European countries. However, different sampling designs were applied since sampling was performed independently in each country. Some countries like Germany chose a multi-stage sampling using regional population registers of individuals; other countries like Denmark used a random sampling from the national household register. The average response rates for baseline/refreshment individuals or households were around 50% and for previous participants around 80%. Additional details regarding the sampling and data collection methods can be found elsewhere.[19] The Ethics Council of the Max-Planck-Society for the Advancement of Science is responsible for ethical reviews and the approval of the study from wave 4 onwards.

Well-being

Well-being is the outcome variable and was measured using the validated 12-item version of the CASP-scale (control, autonomy, self-realization and pleasure). This instrument includes items assessing physical, mental and social well-being. The range of CASP-scale goes from 12, the lowest level of well-being, to 48, the highest level.[21] The SHARE questionnaire included the 12 items of CASP-scale as a part of the Mental Health Module.[19]

Binge drinking

Data on alcohol consumption included current status, frequency, quantity and binge drinking. Participants were asked the following questions: '*During the last 3 months, how often have you drunk any alcoholic beverages, like beer, cider, wine, spirits or cocktails?*' and '*Have you ever drunk alcoholic beverages?*'. Individuals replying 'not at all' to the first question and 'no' to the second question were categorized as never drinkers. Those who replied 'not at all' to the first question and 'yes' to the second question were categorized as former drinkers. Those replying anything other than 'not at all' to the first question were classified as current drinkers. These current drinkers were then categorized into binge drinkers or no-binge drinkers by their response to the question '*how often did you have six or more drinks on one occasion?*'. Those reporting drinking six or more standard drinks on one occasion at least monthly were categorized as binge drinkers.[22]

Drinking culture regions

Based on previous studies, we categorized drinking culture regions as follows: Southern (Italy, Portugal and Spain); Central (Austria, Belgium, France, Germany, the Netherlands and Switzerland); Northern (Denmark and Sweden) and Eastern (Czech Republic, Estonia, Hungary, Poland and Slovenia).[13] Some studies classify France as Southern European,[23] so we conducted sensitivity analysis with France categorized as Southern European to assess the robustness of our inferences to this classification.

Other variables

Other covariates included in the analysis to control for potential sources of confounding: education level (International Standard

Table 1 Study sample characteristics in four European drinking culture regions by gender

Regions[a]	Overall	Men Southern	Central	Northern	Eastern	Overall	Women Southern	Central	Northern	Eastern
Unweighted *N*	25 374	4106	10 743	1930	8595	33 115	5127	13 784	2297	11 907
Mean age, SD	65.4(9.5)	65.5(7.6)	65.6(8.5)	66.0(12.6)	64.7(13.2)	67.4(10.9)	67.7(8.1)	67.5(9.9)	67.4(14.8)	66.5(15.3)
Foreign-born %	7.94%	2.02%	12.79%	7.26%	3.17%	7.44%	2.19%	11.79%	7.68%	3.66%
Living with partner	75.53%	77.05%	80.16%	75.95%	73.12%	58.14%	60.54%	58.13%	58.80%	53.28%
Diff. make ends meet %	37.28%	48.49%	27.32%	12.44%	64.48%	45.46%	59.82%	30.86%	17.25%	70.82%
Education[b]										
Low education %	36.22%	65.02%	21.36%	31.31%	29.90%	50.10%	77.19%	35.96%	35.15%	50.10%
Medium education %	42.04%	24.21%	48.82%	37.76%	56.79%	33.14%	13.17%	41.57%	31.42%	33.14%
High education %	21.73%	10.77%	29.82%	30.93%	13.32%	16.75%	9.64%	22.46%	33.43%	16.75%
Smoking										
Never smokers %	38.06%	40.37%	38.50%	41.31%	30.57%	67.08%	74.74%	74.74%	47.04%	67.08%
Current smokers%	22.10%	22.92%	19.13%	18.51%	32.17%	14.08%	11.81%	13.61%	17.19%	14.08%
Former smokers%	39.84%	36.71%	42.37%	40.18%	37.26%	18.84%	13.45%	20.77%	35.77%	18.84%

a: Regions. Southern (Italy, Spain and Portugal); Central (Austria, Belgium, Germany and the Netherlands); Northern (Sweden and Denmark) and Eastern (Czech Republic, Poland, Hungary, Slovenia and Estonia).

b: Measured on the International Standard Classification of Education Scale (ISCED-97); low (0–2), medium (3–4), high (5–6).

Classification of Education Scale (ISCED-11)); economic difficulties (difficulties to make ends meet yes/no); country of birth (born in a different country yes/no); marital status (living with partner yes/no); age (continuous); and smoking (current, former or never smoker). We used information obtained at wave 4 when available or if unavailable, we carried forward the response from the immediate past interview with data.

Statistical analysis

Characteristics of the sample were summarized by regions and by gender. Alcohol consumption was categorized as never, former, current (no-binge) and current (binge drinker). Well-being (outcome variable) was measured using the CASP12 and was operationalized as a continuous variable. This variable was slightly skewed but we opted to not perform any transformation of it to improve interpretability, and checked linear regression assumptions through analysis of residuals.

In order to properly account for potential clustering of well-being and alcohol consumption patterns by country we fitted a linear mixed effects model that regressed well-being on alcohol consumption categories and covariates. These models included a random intercept for each country, and have the general form seen below:

$$Y_{ij} = \left(\beta_{00} + \mu_{0j}\right) + \beta_1 * I(\text{Alcohol}) + \beta_2 * \text{Covariates} + \varepsilon_{ij}$$

$$\mu_{0j} \sim N(0, \tau_{00})\ \varepsilon_{ij} \sim N(0, \sigma^2)$$

where Y_{ij} is well-being as reported in the CASP12 tool, subscript i refers to the individual and subscript j refers to the country, μ_{0j} is the random intercept (normally distributed with variance t_{00}), β_1 is a vector of coefficients for alcohol consumption patterns (former, never and binge drinking; with no-binge drinking as the reference category), β_2 is a vector of coefficients for covariates, and ε_{ij} are the level 1 residuals (normally distributed with variance $\sigma 2$). We checked for potential heteroskedasticity of level 1 residuals by country.

All the models were adjusted for the following covariates: age, educational level, smoking behavior, country of birth, presence of economic difficulties and marital status. To formally assess the interaction by gender and region, we constructed models that further included coefficients for gender and/or region and their interaction with alcohol consumption patterns (two- or three-way interactions). In order to test for the statistical presence of interactions, we conducted an omnibus Wald test with the null hypothesis of all interaction coefficients being equal to 0. Rejecting this null hypothesis can be interpreted as the presence of a statistical interaction in the association between alcohol consumption patterns and well-being by either gender and/or region.

All analyses were conducted using STATA IC 13.1. The complex survey structure was acknowledged with the use of STATA's svy routines taking sampling weights into account for descriptive analysis and the mixed effects models. Per SHARE Guidelines,[19] we used the calibrated cross-sectional weights for wave 4 that account for both sample design and non-response/attrition. More details on the calibration of the weights can be found elsewhere.[19] By incorporating these weights, estimates obtained are data representative of the population in each country within a specific age range.[19]

Results

We included a total of 58 489 study participants, of which 43% were men and 57% were women (table 1). The mean age was higher in women (67.4 vs. 65.4 in men, $P < 0.001$). Overall, almost 8% of the study sample was foreign-born, ranging from around 2% in Southern European countries through 13% in Central Europe. Around 75% of men were living with their partner compared with 58% of women ($P < 0.001$). Economic difficulties were more prevalent in Eastern and Southern Europe, compared with Northern and Central Europe ($P < 0.001$). This was paralleled by a higher overall educational level in Northern and Central Europe ($P < 0.001$).

Alcohol consumption patterns varied by gender and region (table 2). Overall, the prevalence of binge drinking was higher in men compared with women (14.6% vs. 3.9%, $P < 0.001$). Among women, the prevalence of binge drinking was higher in Central and Northern Europe (5.1% and 4.8%, respectively) and lowest in Southern and Eastern Europe (2.3% and 2.9%, respectively). Among men, the prevalence was higher in Central Europe (17.3%), followed by Eastern (15.3%), Northern (14.0%) and Southern Europe (9.7%). We also found heterogeneity of alcohol drinking patterns within drinking culture regions. Among men, Northern Europe had the countries with the lowest (Sweden [6.7%]) and the highest (Denmark [26.9%]) prevalence of binge drinking. France had a mixed-drinking pattern that was similar to both Southern Europe and Central Europe.

Well-being, as measured by mean CASP scores, also varied by gender and region (table 2). The mean CASP-scores were significantly higher in men compared with women (37.4 vs. 36.2, $P < 0.001$). We found differences in mean CASP scores between regions, as Southern and Eastern Europe had significantly lower mean CASP scores than Northern and Central Europe (35.5 and 36.0 vs. 39.6 and 38.7, respectively in men; 33.3 and 34.7 vs. 39.4 and 38.2, respectively in women). At the country level, the highest

Table 2 Drinking patterns and well-being in four drinking culture regions and 16 European countries by gender

	Men					Women				
	Former	Never	No Binge	Binge	CASP[a]	Former	Never	No Binge	Binge	CASP[a]
Overall	**16.7%**	**5.1%**	**63.6%**	**14.6%**	**37.4(37.2;37.6)**	**28.6%**	**15.8%**	**51.8%**	**3.9%**	**36.2(36.0;36.4)**
Southern	**17.6%**	**13.6%**	**59.0%**	**9.7%**	**35.5(35.2;35.9)**	**25.6%**	**40.7%**	**31.4%**	**2.3%**	**33.3(33.0;33.7)**
Italy	13.5%	18.1%	57.5%	10.9%	35.0(34.4;35.5)	24.6%	41.2%	30.8%	3.4%	32.7(32.1;33.3)
Portugal	18.1%	12.4%	55.4%	14.1%	32.9(32.2;33.7)	20.4%	53.1%	24.5%	2.0%	31.0(30.5;31.5)
Spain	23.4%	7.5%	62.1%	7.0%	37.0(36.6;37.4)	28.2%	37.0%	33.8%	0.9%	34.8(34.4;35.3)
Central	**14.1%**	**0.9%**	**67.7%**	**17.3%**	**38.7(38.4;39.0)**	**24.6%**	**3.2%**	**67.2%**	**5.1%**	**38.2(38.0;38.5)**
Austria	11.3%	5.2%	64.2%	19.3%	40.0(39.7;40.3)	22.3%	12.0%	58.6%	7.1%	39.3(39.0;39.5)
Belgium	10.8%	3.1%	64.7%	21.3%	37.7(37.4;38.1)	14.8%	10.0%	68.6%	6.6%	36.8(36.4;37.1)
France	11.4%	1.1%	73.6%	13.9%	38.6(38.2;38.9)	24.2%	4.5%	68.3%	3.0%	37.4(37.1;37.8)
Germany	17.4%	0.0%	64.0%	18.5%	38.2(37.6;38.8)	27.0%	0.1%	66.7%	6.2%	38.3(37.8;38.7)
Netherlands	13.3%	0.7%	66.4%	19.6%	40.9(40.5;41.2)	26.5%	3.4%	66.6%	3.5%	40.5(40.2;40.8)
Switzerland	6.8%	3.4%	73.6%	16.1%	40.9(40.6;41.1)	13.0%	7.8%	71.4%	7.8%	40.4(40.2;40.6)
Northern	**9.9%**	**0.0%**	**76.0%**	**14.0%**	**39.6(39.3;39.9)**	**15.9%**	**0.3%**	**79.0%**	**4.8%**	**39.4(39.1;39.7)**
Denmark	5.7%	0.0%	67.4%	26.9%	40.8(40.5;41.1)	10.4%	0.4%	78.2%	11.0%	40.7(40.3;41.0)
Sweden	12.4%	0.1%	80.9%	6.7%	39.0(38.5;39.4)	19.0%	0.2%	79.5%	1.2%	38.6(38.2;39.1)
Eastern	**25.8%**	**3.8%**	**55.2%**	**15.3%**	**36.0(35.7;36.4)**	**49.2%**	**11.4%**	**36.5%**	**2.9%**	**34.7(34.4;35.0)**
Czechia	17.7%	8.4%	54.4%	19.5%	35.6(35.2;35.9)	28.9%	17.0%	46.9%	7.2%	34.2(33.9;34.5)
Estonia	21.2%	4.8%	56.1%	17.9%	35.2(34.9;35.5)	27.8%	20.8%	46.7%	4.7%	35.1(34.9;35.3)
Hungary	20.4%	8.6%	58.3%	12.7%	34.7(33.9;35.4)	32.1%	35.1%	31.4%	1.4%	33.5(32.9;34.1)
Poland	30.6%	0.0%	54.3%	15.1%	36.3(35.8;36.9)	62.6%	0.8%	34.4%	2.2%	35.0(34.4;35.5)
Slovenia	12.5%	21.6%	58.5%	7.4%	39.8(39.5;40.2)	11.5%	44.7%	43.0%	0.9%	38.7(38.3;39.0)

a: **CASP-12** (control, autonomy, self-realization and pleasure) Score ranges from 0—min.—to 48—max. Shown as mean (95% confidence interval.).

Table 3 Adjusted association between well-being and drinking patterns among participants aged 50 and older of SHARE wave 4 by gender ($n = 58\,489$)

Alcohol drinking patterns	All[a]		Men[c]		Women[c]	
	β(CI)[b]	*P*-val	β (CI)[b]	*P*-val	β (CI)[b]	*P*-val
Former drinkers	−1.48(−1.98; −0.99)	<0.001	−1.41(−2.12; −0.69)	<0.001	−1.55(−1.95; −1.16)	<0.001
Never drinkers	−1.41(−1.95; −0.86)	<0.001	−0.91(−1.59; −0.23)	0.009	−1.56(−2.21; −0.91)	<0.001
No-binge drinkers	0 (Reference)		0 (Reference)		0 (Reference)	
Binge drinkers	−0.98(−1.50; −0.47)	<0.001	−0.86(−1.27; −0.45)	<0.001	−1.26(−2.34; −0.18)	0.023
Male	0 (Reference)		N/A		N/A	
Female	−0.24(−0.89;0.41)	0.465	N/A		N/A	
Age: <55	0 (Reference)		0 (Reference)		0 (Reference)	
Age: 56–65	0.03(−0.75;0.81)	0.945	0.03(−0.75;0.82)	0.934	0.03(−0.75;0.82)	0.934
Age: 66–75	−0.48(−1.61;0.65)	0.402	−0.47(−1.60;0.66)	0.415	−0.47(−1.60;0.66)	0.415
Age: 76–85	−2.07(−3.65; −0.49)	0.01	−2.05(−3.63; −0.47)	0.011	−2.05(−3.63; −0.47)	0.011
Age: >85	−3.35(−4.74; −1.96)	<0.001	−3.33(−4.72; −1.94)	<0.001	−3.33(−4.72; −1.94)	<0.001
Never smoker	0 (Reference)		0 (Reference)		0 (Reference)	
Current smoker	−0.59(−1.06; −0.13)	0.012	−0.59(−1.05; −0.12)	0.013	−0.59(−1.05; −0.12)	0.013
Former smoker	−0.04(−0.34;0.26)	0.793	−0.03(−0.34;0.27)	0.829	−0.03(−0.34;0.27)	0.829
National	0 (Reference)		0 (Reference)		0 (Reference)	
Foreigner	−0.62(−0.96; −0.29)	<0.001	−0.63(−0.95; −0.30)	<0.001	−0.63(−0.95; −0.30)	<0.001
Primary ed.	0 (Reference)		0 (Reference)		0 (Reference)	
Secondary ed.	0.80(0.41;1.18)	<0.001	0.79(0.40;1.17)	<0.001	0.79(0.40;1.17)	<0.001
Tertiary ed.	1.36(0.88;1.84)	<0.001	1.36(0.88;1.84)	<0.001	1.36(0.88;1.84)	<0.001
Makes ends meet: yes	0 (Reference)		0 (Reference)		0 (Reference)	
Makes ends meet: no	−4.00(−4.38; −3.62)	<0.001	−4.00(−4.37; −3.62)	<0.001	−4.00(−4.37; −3.62)	<0.001
No living partner	0 (Reference)		0 (Reference)		0 (Reference)	
Living partner	0.76(0.44;1.08)	<0.001	0.76(0.44;1.09)	<0.001	0.76(0.44;1.09)	<0.001

a: Mixed effects (random effect for country) linear model adjusted by covariates: age, gender, education level, smoking behavior, immigration status, economic difficulties and personal relationships.

b: Confidence interval 95%.

c: Mixed effects (random effect for country) linear model adjusted by covariates: age, gender, education level, smoking behavior, immigration status, economic difficulties and personal relationships. Includes an interaction coefficient between alcohol and gender.

mean CASP scores were observed among men and women in the Netherlands (40.9 and 40.5), Switzerland (40.9 and 40.4) and Denmark (40.8 and 40.7), while the lowest mean CASP scores were observed in Portugal, for both men and women (32.9 and 31.0 respectively).

Association between binge drinking and well-being

Overall, former, never and binge drinkers had lower self-reported well-being when compared with no-binge drinkers ($\beta = -1.48$, 95% CI: −1.98 to −0.99, $P < 0.001$; $\beta = -1.41$, 95% CI: −1.95 to −0.86, $P < 0.001$; and $\beta = -0.98$, 95% CI −1.49 to −0.46, $P < 0.001$; respectively) (table 3). This association, however, differed by gender, with women having stronger associations between alcohol consumption patterns and well-being in general (overall *P* values for interaction = 0.0157), especially among never and binge drinkers. The table also shows the association with the CASP score of the confounders included into the model. Older people, foreigners, people with lower education, without a living partner, and those

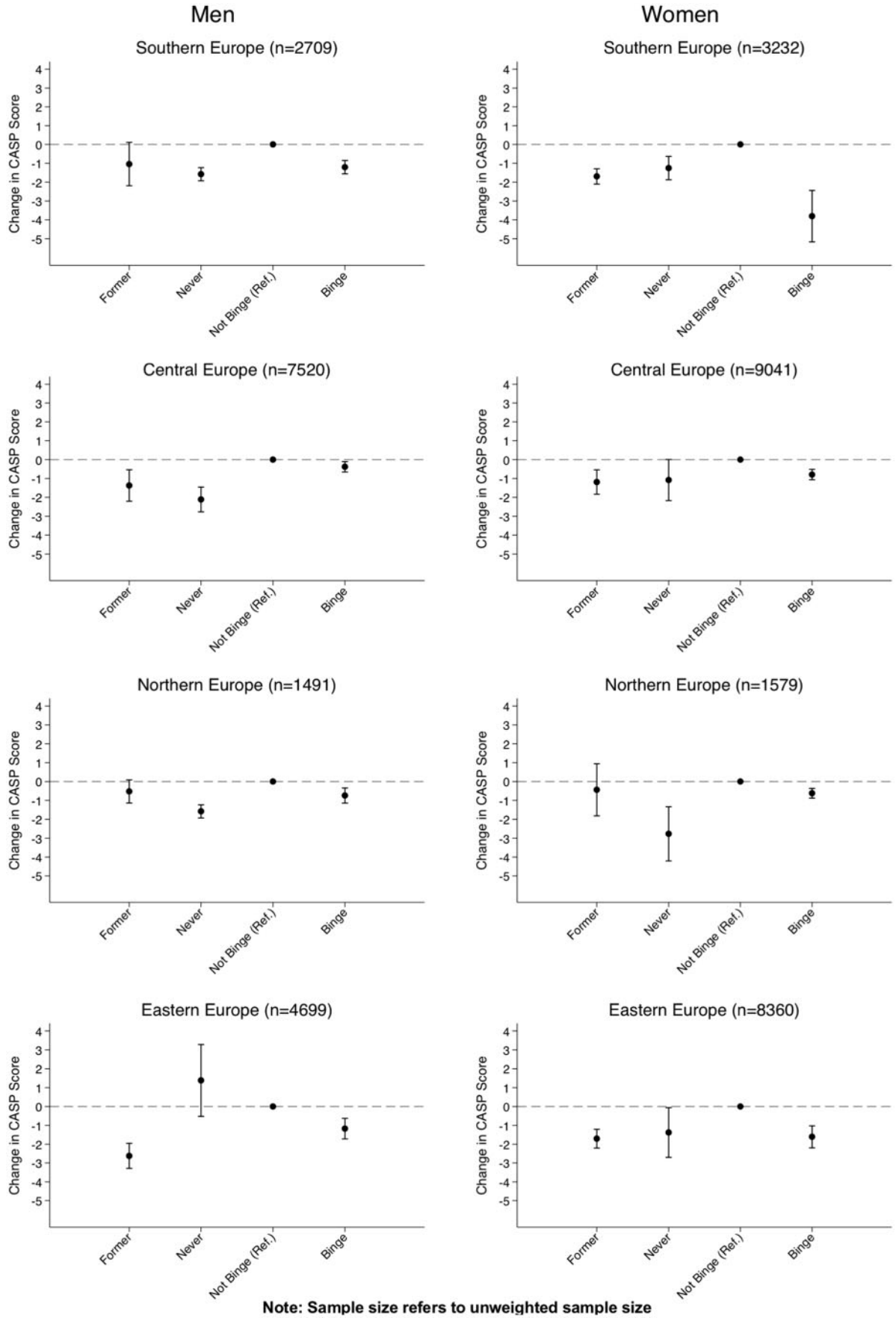

Figure 1 Adjusted association [a] between well-being and drinking patterns among participants aged 50 and older of SHARE wave 4 by gender and European Region [b] ($n = 58\,489$). a: Mixed effects (random effect for country) linear model adjusted by covariates: age, education level, smoking behavior, immigration status, economic difficulties and personal relationships. 95% confidence interval. b: Regions. Southern (Italy, Spain and Portugal); Central (Austria, Belgium, Germany and the Netherlands); Northern (Sweden and Denmark) and Eastern (Czech Republic, Poland, Hungary, Slovenia and Estonia)

who have difficulties making ends meet all had a significantly lower CASP score.

Gender and region specific differences in the association between binge drinking and well-being

Figure 1 shows the adjusted association between drinking patterns and well-being stratified by gender and drinking culture region. There was a highly significant overall statistical interaction between region, gender and alcohol consumption (P values for interaction <0.001).

Among men, the association between alcohol consumption patterns and well-being was statistically significantly different by region (overall P values for the interaction coefficients by region for former, never and binge drinking men = 0.001, 0.003 and 0.002, respectively). Former drinking was consistently associated with lower well-being, and this association was stronger in Eastern Europe ($\beta = -2.61$, 95% CI: −3.29 to −1.95, $P < 0.001$). Never drinking was associated with lower well-being in Central ($\beta = -2.11$, 95% CI −2.76 to −1.46, $P < 0.001$), Southern Europe ($\beta = -1.58$, 95% CI −1.93 to −1.23, $P < 0.001$) and with a higher, but non-significant, well-being in Eastern Europe ($\beta = 1.38$, 95% CI: −0.51 to 3.29, P values = 0.154). Binge drinking was associated with significantly lower well-being in Southern ($\beta = -1.21$, 95% CI −1.56 to −0.85, $P < 0.001$) and Eastern European ($\beta = -1.17$, 95% CI −1.72 to −0.62, $P < 0.001$), as compared with Northern ($\beta = -0.74$, 95% CI −1.14 to −0.34, $P < 0.001$) and Central Europeans ($\beta = -0.38$, 95% CI −0.65 to −0.10, $P = 0.007$).

Among women, there were significant differences in the associations of binge drinking by region (overall P values interaction <0.001). While the association was significantly negative in all regions, this was especially strong among Southern European women ($\beta = -3.80$, 95% CI −5.16 to −2.44, $P < 0.001$), as compared with Eastern ($\beta = -1.61$, 95% CI −2.19 to −1.02, $P < 0.001$), Central ($\beta = -0.79$, 95% CI −1.07 to −0.52, $P < 0.001$) and Northern European women ($\beta = -0.62$, 95% CI −0.88 to −0.36, $P < 0.001$). No significant differences existed by region in the association between other alcohol drinking patterns and well-being (overall P values for the interaction coefficients by region for former and never drinking = 0.106 and 0.280, respectively)

The interaction between drinking patterns and well-being by gender and drinking culture region was robust to our sensitivity analysis including France in the Southern European region.

Discussion

In this large cross-sectional study of middle age and older adults in Europe we described the prevalence of four different drinking patterns with a focus on binge drinking across four European regions as well as an association between binge drinking and well-being. In both men and women, former drinkers and binge drinkers have lower well-being compared with no-binge drinkers, but these associations were stronger for women. The strength of these associations varied across European regions, with more pronounced negative associations in well-being in Eastern and Southern countries.

Binge drinking has been associated with negative short term (alcohol poisoning, injury, etc.) and long term effects (high-blood pressure, stroke, and other cardiovascular diseases, liver disease or neurological damage).[24–26] To the best of our knowledge, most of the studies on binge drinking in older adults have had a small sample size,[27,28] and have not focused on the association with well-being. Our results add support to the literature on relation of binge drinking and well-being, and extend these findings by demonstrating that there are significant differences in the strength of the association across gender and European region. In addition, our study demonstrated that former drinkers had lower well-being which may be explained by the fact that a good proportion of former drinkers may have been binge drinkers in the past. Indeed, the 'sick quitter effect' has been described before,[29–32] and our results support such confounding phenomenon. Moreover, we also found lower well-being among never drinkers. Given that previous reports have highlighted the substantial misclassification of former drinkers into the category of never drinkers when using self-reported measures of lifetime alcohol use,[33] we need to be cautious with the interpretation of the results for never drinkers.

Our results highlight that social and cultural features of drinking behavior must be taken into consideration when analyzing the association between alcohol consumption and its related problems.[23] The distribution of drinking patterns in a country or region is associated to drinking culture, since individual drinking behaviors are sharply influenced by the drinking habits of individuals within their social network.[34] For example, given that tolerance to drunkenness is very low in Southern Europe, the lack of social approval may make binge drinkers more isolated leading to decreased well-being, when compared with more accepted no-binge drinkers.[23,27,33] This is consistent with our finding that binge drinking in Southern European countries, while less frequent, seems associated with lower well-being.

We found a gender gap in the association between binge drinking and well-being, whereby the negative association was more evident in women. There is an emerging research on the association between gender inequalities at country level and alcohol drinking differences between men and women with most of the studies showing a positive association between gender equality and prevalence of hazardous drinking patterns in women.[17,35] A study using GENACIS data showed that among women, there were differences between private and public drinking patterns, and public drinking was correlated with cultural acceptance of drunkenness in each country.[36] We found that the group with worst well-being is women who self-report binge drinking and who live in Southern Europe, this is consistent with a lack of social approval of binge drinking in Southern Europe compared with Northern or Central Europe and also to the larger gender inequalities observed in Southern Europe.[17] Moreover, tolerance towards drunkenness may be lower for women, as seen in previous studies,[37] a concept that is consistent with our finding of especially negative associations of binge drinking and well-being in Southern European women. This observation is coherent with the intersectionality Theory which postulates that when analyzing health inequalities, there should be a consideration of the interaction of all the dimensions of the individual as gender, social class and race/ethnicity,[38] or in our case, socio-cultural factors. Future studies are needed to more thoroughly disentangle the mechanisms for this gender gap and to guide policy to reduce this disparity.

Limitations and strengths

Our study has some limitations. We used self-reported alcohol consumption which may be underreported in population surveys due to recall bias and social desirability bias.[39] In addition, we were limited by the questions included in the SHARE survey and therefore were not able to examine different sex-specific cut-points to define binge drinking. We measured well-being through CASP-scale which was the only available tool available in the SHARE study. The CASP-scale is considered a comprehensive psychometric tool for older people that not only includes the construct of self-reported health but also factors such as autonomy or self-realization,[21,40] however, little is known about its stability over time. Studies using other tools have demonstrated large short-term variations in the self-report of well-being and differences across instruments.[41,42] Due to the cross-sectional design of the study, we cannot establish causality or temporality between the exposure and the outcome. Furthermore, this study was observational and although we adjusted for the relevant known confounders, the possibility of confounding by unknown confounders or poorly measured confounders remains.

Our study has a number of strengths. It includes a very large and well-characterized sample of older men and women from 16 different European countries. We modeled our associations using a robust parameterization of linear mixed effects models that account for within country correlations. We used an *a-priori* theorized categorization of drinking cultures which allows for a more intricate connection to the previous literature.

Conclusions

In this study, we found differences in alcohol binge drinking across four European Regions, amongst men and women, and different associations of binge drinking with well-being. Policy makers must be aware of this existing regional and gender differences and the role of socio-cultural acceptance of certain drinking patterns on the association between alcohol consumption and health effects. In Europe, especially in Southern countries, women represent a vulnerable group that should be targeted when developing alcohol-related public health interventions.

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Key points

- We found significant differences by gender and region in the association between binge drinking and well-being in a diverse sample of Europeans over 50-years-old.
- Binge drinkers in Southern Europe have lower well-being than in Northern and Central Europe, whereas former drinkers in Eastern Europe have especially decreased well-being.
- The gender disparities of the association between alcohol drinking patterns and well-being also differed by region. Binge drinking women in Southern European countries have an especially decreased well-being when compared with no-binge drinkers. This association was not as strong in other European regions.

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The effectiveness of current French health warnings displayed on alcohol advertisements and alcoholic beverages

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Background: Many countries use health warnings in an attempt to regulate alcohol consumption. However, there is a lack of conclusive evidence in the research on alcohol warnings to support decision-making on effective health policies. This study explores the effectiveness of two mandatory warnings introduced in France in 1991 and 2007: the first (Alcohol abuse is harmful) is displayed on alcohol advertisements; the second (a pictogram) on bottles. Given that advertising content regulations have been implemented in some countries to reduce the attractiveness of alcohol marketing (e.g. the Evin law in France), this research also aims to explore whether such regulations can improve the effectiveness of warnings. **Methods:** In-depth interviews were conducted with 26 French people aged 15–29 years. The effectiveness of health warnings was assessed in terms of recall, noticeability, credibility, comprehension, responsiveness, and ability to encourage moderate drinking and abstinence during pregnancy. Participants were shown alcohol advertisements and bottles that either followed or challenged content regulations. The data were analyzed using double manual coding and NVivo software. **Results:** While both warnings suffered from a lack of visibility and noticeability due to their size, location, and outdatedness and because of competition from marketing design elements, the warning on the advertisement that followed content regulations was most visible. Both warnings were considered to be informationally vague, lacking in credibility and ineffective in terms of making participants feel concerned and influencing consumption habits. **Conclusions:** Current French warnings are ineffective and require modification. Improvements are suggested regarding the design and content of warnings to help increase their effectiveness.

Introduction

Responsible for 3.3 million deaths worldwide, alcohol consumption causes diseases (cardiovascular diseases, cancer, foetal alcohol syndrome, etc.) and social problems (road accidents, murders, etc.).[1] It is the third highest risk factor[2] in Europe, which has one of the highest alcohol consumption rates worldwide (11 litres of pure alcohol per person per year[3]). Moreover, Europe's