Patterns of alcohol consumption and health-related quality of life in older adults

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ABSTRACT

Background: Health-related quality of life (HRQOL) is a more powerful predictor of health services use and mortality than many objective measures of health. However, in older adults the association between main alcohol drinking patterns and HRQOL is uncertain.

Methods: A prospective cohort with 2163 community-dwelling individuals aged ≥60 years was recruited in Spain in 2008-2010 and followed-up through 2012. At baseline, participants reported alcohol consumption. HRQOL was measured with the SF-12 questionnaire, at baseline and in 2012.

Results: In cross-sectional analyses at baseline, compared to non-drinkers, better scores on the physical component summary (PCS) of the SF-12 were reported in moderate (β=1.59 [95% confidence interval 0.61 to 2.58]) and heavy drinkers (β=2.18 [0.57 to 3.79]). Better scores on the PCS were also reported by drinkers who adhered to the Mediterranean drinking pattern (MDP) (β=1.43 [0.30 to 2.56]) as well as those who did not (β=1.89 [0.79 to 2.99]). However, no association was observed between average alcohol consumption or the MDP and the mental component summary (MCS) of the SF-12; or between beverage preference or drinking with meals and either the PCS or MCS scores. In prospective analyses, women who reportedly drank exclusively with meals showed better scores on the PCS than women who drank only outside of meals (β=3.64 [0.79 to 6.50]).

Conclusions: The small association between alcohol consumption and better physical HRQOL found at baseline was not apparent after a few years of follow-up. Medical advice on alcohol consumption cannot be grounded on its effects on HRQOL.

Key words: Alcohol, health-related quality of life, elderly, cohort study.

1. Introduction

As a consequence of population ageing, the number of people aged 60 or over will nearly triple between 2013 and 2050, increasing from 12% to 21% of the total population (from 23% to 32% in developed countries) (United Nations, 2013). Although alcohol intake seems to decline with age, a significant number of older people drink alcoholic beverages (Crome et al., 2011; León-Muñoz et al., 2015). Alcohol consumption has many harmful health effects, and is one of the main causes of burden of disease (Lim et al., 2012). However, it may also have beneficial effects when consumed in small, regular amounts. Data from observational studies show that low-to-moderate alcohol consumption is associated with a reduced risk of cardiovascular disease (CVD), diabetes, frailty, and all-cause death among middle-aged and older adults (Gea et al., 2014; Mukamal et al., 2006; Ortolá et al.,2015; Ronksley et al., 2011).

Health-related quality of life (HRQOL) is a multidimensional subjective evaluation of positive and negative aspects of life that affect health. Thus, the concept of HRQOL broadens the traditional assessment of health, in terms of morbidity or mortality, by including domains of physical, mental and social wellbeing (Centers for Disease Control and Prevention, 2015). Therefore, HRQOL is an important tool, particularly among older adults, since traditional health outcomes do not account for the perceived functional limitations that occur later in life (Centers for Disease Control and Prevention, 2015). Moreover, HRQOL is a more powerful predictor of health services use and mortality than many objective measures of health (Dominick et al., 2002; Otero-Rodríguez et al., 2010; Rodríguez-Artalejo et al., 2005).

A number of studies have reported a relationship between alcohol consumption and HRQOL in a variety of samples, including alcoholics (Barros da Silva Lima et al., 2005; Donovan et al., 2005; Ginieri-Coccossis et al., 2007), primary care patients (Volk et al., 1997) and the general population (Kaplan et al., 2012; Kim and Kim, 2015; Martinez et al., 2014; Mathiesen

et al., 2012; Paul et al., 2011; Pisinger et al., 2009; Riise et al., 2003; Saarni et al., 2008; Valencia-Martín et al., 2013; Van Dijk et al., 2004) in multiple countries, but results have been inconsistent. Differences in patterns of alcohol consumption across populations may account for the heterogeneity of these findings; specifically, in addition to average alcohol intake, the type of alcoholic beverage, as well as the context of drinking, may influence health outcomes. Also, most of the studies evaluating the association between alcohol consumption and HRQOL have had a cross-sectional design, which limits causal inference, and the few longitudinal studies conducted have followed mostly alcoholics receiving treatment, precluding extrapolation to the general population. Most importantly, there is little information on the relationship between alcohol consumption and HRQOL in older adults. To our knowledge, only two studies have evaluated this association in individuals aged 50 and above, with inconsistent results (Kaplan et al., 2012; Martinez et al., 2014). The first of these studies (Kaplan et al., 2012), with a prospective design, found a lower reduction in HRQOL over time among moderate drinkers compared to lifetime abstainers and infrequent drinkers. The second (Martinez et al., 2014), a cross-sectional study based on 3666 participants in South Africa, failed to find any association. Furthermore, these studies did not investigate beverage preferences or the context of drinking, and were conducted in countries where drinking patterns in older adults are traditionally different from those of Southern European countries.

This study aimed to evaluate the cross-sectional and prospective associations between patterns of alcohol consumption and HRQOL in a cohort of community-dwelling older adults in Spain. Specifically, the effect of the Mediterranean drinking pattern (MDP), defined as reported moderate alcohol intake with wine preference and drinking only with meals, on HRQOL was assessed. Based on previous evidence showing that low-to-moderate alcohol consumption has beneficial effects on the health of older adults, we hypothesized that low-to-

moderate alcohol consumption, and in particular the Mediterranean drinking pattern, would be associated with better HRQOL.

2. Methods

2.1 Study design and population

Participants of the Seniors-ENRICA cohort were selected in 2008-2010 by stratified cluster sampling of the non-institutionalized adult population of Spain. First, the sample was stratified by province and size of municipality, then clusters were selected randomly in two stages (municipalities and census sections), and finally, households were selected by random telephone dialing. Subjects in the households were selected proportionally to the age and sex distribution of the population in Spain (León-Muñoz et al., 2014; Rodríguez-Artalejo et al., 2011). At baseline, information was collected in three stages: a phone interview (used to obtain data on socio-demographic factors, lifestyle and morbidity) and two home visits. In the first visit, nurses collected blood and urine samples, while in the second, a physical examination was conducted, a diet history was recorded, and information on prescribed medications and functional limitations was obtained (León-Muñoz et al., 2014; Rodríguez-Artalejo et al., 2011). Participants aged 60 or over (N=2614) were followed through 2012, when a second wave of data collection was performed.

Study participants provided written informed consent, and the Clinical Research Ethics Committee of 'La Paz' Hospital in Madrid approved the study.

2.2 Study variables

2.2.1 Alcohol consumption

At baseline, habitual alcohol consumption was estimated with a validated diet history, developed from the one used in the EPIC cohort study in Spain (Guallar-Castillón et al., 2014;

León-Muñoz et al., 2015). This diet history collected information on 34 alcoholic beverages and used photographs to help quantify portion sizes. Standard beverage composition tables were used to estimate alcohol content. Study participants were classified as non-drinkers (including also occasional drinkers), ex-drinkers, moderate drinkers and heavy drinkers. The threshold between moderate and heavy drinking was set at ≥40 g/day in men and ≥24 g/day in women (León-Muñoz et al., 2015). A preference for wine or other alcoholic beverage was considered when it accounted for more than 80% of alcohol consumed (Valencia-Martín et al., 2011). Drinkers were also classified into those who drank only with meals (lunch and dinner), those who drank only outside of meals, and those who drank at any time. Finally, a Mediterranean drinking pattern (MDP) was defined as moderate average alcohol consumption (and no binge drinking), with wine preference and drinking exclusively with meals (Willett et al., 1995). This pattern was used because there is recent evidence that adherence to the MDP is associated with a reduction in mortality that cannot be entirely explained by moderate drinking (Gea et al., 2014).

2.2.2 Health-related quality of life

HRQOL was measured at baseline and at the end of follow-up using the second version of the 12-item Short Form Health Survey (SF-12) (Ware, 2005), previously validated in Spain (Schmidt et al., 2012). The SF-12 comprises 8 dimensions of quality of life, which can be combined into a physical component summary (PCS) and a mental component summary (MCS). Both summaries were standardized to a national norm with a mean of 50 and a standard deviation of 10. Higher scores in the PCS or the MCS indicated better HRQOL, with a 2-point and an 8-point difference deemed to be, respectively, a small and a moderate-to-large difference (Kazis et al., 1989; Vilagut et al., 2008).

2.2.3 Potential confounders of the study association

At baseline, information was collected on variables that, according to the literature, might be related to both alcohol consumption and HRQOL, such as sex, age, educational level, tobacco smoking, time spent watching TV, physical activity at leisure time and in the household, and adherence to the Mediterranean diet using the Mediterranean Diet Score (MDS), excluding the alcohol consumption item (León-Muñoz et al., 2014; Trichopoulou et al., 2003). A higher score in the MDS indicates a better adherence to the Mediterranean diet. Weight and height, measured in standardized conditions (Gutiérrez-Fisac et al., 2012), were used to calculate the body mass index (BMI) as the weight in kg divided by the square of height in m. Morbidity was assessed by asking the participants if they had been previously diagnosed with cardiovascular disease (myocardial infarction, stroke or heart failure), diabetes, chronic respiratory disease (asthma or chronic bronchitis), osteomuscular disease (osteoarthritis, arthritis or hip fracture), sleep apnea, or depression requiring treatment. Functional limitations in instrumental activities of daily living (IADL) were measured with the Lawton and Brody Scale (Lawton and Brody, 1969), with the questions on subjects' ability to prepare meals, do household chores, and care for clothing being excluded in men.

2.3 Statistical analysis

From the initial sample of 2614 participants in 2008-10, 95 (3.6%) individuals died during follow-up [mean (SD) follow-up period: 3.3 (0.6) years]. From the remaining 2519 participants, 118 were lost to follow-up, so information on HRQOL was only assessed among 2401 participants (retention rate: 91.9%). From these, we excluded 90 who lacked information on the PCS or MCS scores (either at baseline or at follow-up), 121 without complete data on alcohol consumption, 9 with unreliable diet history and 18 with missing information on potential confounders. Thus analyses were performed with 2163 individuals.

Analyses of average alcohol consumption and the MDP were conducted in the total sample, while analyses of beverage preference and drinking with meals were performed only among drinkers.

The cross-sectional associations between each pattern of alcohol consumption and the PCS or MCS baseline scores were summarized with β coefficients and their 95% confidence intervals (CI), obtained from linear regression. Two models were fit. Model 1 adjusted for sex, age and educational level, while model 2 further adjusted for tobacco smoking, BMI, time watching TV, physical activity, diet quality, morbidity and the Lawton-Brody IADL score. The same type of analyses was performed to summarize the prospective associations between each pattern of alcohol consumption at baseline and the PCS or MCS at follow-up. However, in this case, the linear regression models were additionally adjusted for baseline PCS and MCS scores.

We assessed whether the study results varied with sex by testing the statistical significance of interaction terms defined as the product of sex by categories of alcohol drinking patterns. The only interaction found was between sex and drinking with meals in the longitudinal analyses, so results for this variable are presented stratified by sex.

Statistical analyses were performed using Stata®, version 11.2.

3. Results

Table 1 shows the PCS and MCS scores of the SF-12 at baseline and at follow-up, according to baseline socio-demographic, lifestyle and clinical characteristics of study participants. Mean (SD) PCS and MCS scores were, respectively, 45.7 (11.5) and 52.1 (10.5) at baseline and 44.5 (12.4) and 52.9 (10.9) at follow-up. Baseline and follow-up PCS scores were lower (worse HRQOL) in women, individuals with older age, never smokers, participants with lower educational level or higher BMI, as well as in those who experienced more morbidity or

disability. Participants who spent less time watching TV and did more physical activity showed higher baseline PCS scores. Results for baseline MCS scores were in the same direction, although they did not vary with baseline BMI. Additionally, younger individuals and those who did more physical activity in the household showed lower MCS scores.

Table 2 shows the cross-sectional association between patterns of alcohol consumption and HRQOL at baseline. Compared to non-drinkers, the score on the PCS was somewhat better in both moderate drinkers (β = 1.59 [95% CI 0.61 to 2.58]) and heavy drinkers (β = 2.18 [0.57 to 3.79]) in the fully-adjusted model. By contrast, although in model 1 we observed higher MCS scores in heavy drinkers than non-drinkers (β = 1.80 [0.11 to 3.48]), this association did not achieve statistical significance in the fully-adjusted model. No association was found between beverage preference or drinking with meals and the PCS or MCS scores. Finally, compared to non-drinkers, better scores on the PCS were reported both by drinkers who adhered to the MDP (β = 1.43 [0.30 to 2.56]) and drinkers who did not (β = 1.89 [0.79 to 2.99]). Adherence to the MDP was not associated with the MCS.

Table 3 shows the prospective association between alcohol drinking patterns at baseline and HRQOL at follow-up. Overall, neither average alcohol consumption nor beverage preference were associated with the PCS or the MCS of the SF-12. Women who drank only with meals showed better scores on the PCS than women who drank only outside of meals (β = 3.64 [0.79 to 6.50]) in the fully-adjusted model. Finally, no association was found between adherence to the MDP and either the PCS or MCS scores.

We conducted a number of sensitivity analyses to test whether the lack of prospective association between the MDP and HRQOL was robust. First, because HRQOL at baseline and at the end of follow-up could be severely affected by disability, analyses were replicated after excluding the 218 individuals with limitations in IADL. Second, given that HRQOL, and

particularly the MCS score, overlaps with depression, we repeated the analyses after excluding the 176 subjects diagnosed with depression requiring drug treatment. And third, given that the MDP has been linked to lower risk of cardiovascular disease and diabetes, we wanted to determine whether the observed results were influenced by the incidence of these diseases during follow-up; to this end, the analyses were repeated after excluding the 160 individuals diagnosed with cardiovascular disease or diabetes during follow-up. Sensitivity analyses gave similar results, except that ex-drinkers, compared to never-drinkers, showed worse scores in the PCS when we excluded individuals with baseline limitations in IADL(β = -1.87 [-3.62 to -1.10]) or with incident cardiovascular disease or diabetes (β = -1.72 [-3.35 to -0.08]).

4. Discussion

In this study of community-dwelling older adults in Spain, we found a cross-sectional association between average alcohol consumption and HRQOL. Both self-reported moderate and heavy drinkers registered better physical HRQOL at baseline than non-drinkers, although these associations were small in magnitude. However, our results provide no evidence that alcohol consumption improves HRQOL over time.

A number of population-based studies with cross-sectional design have evaluated the association between alcohol consumption and HRQOL (Kim and Kim, 2015; Martinez et al., 2014; Mathiesen et al., 2012; Paul et al., 2011; Pisinger et al., 2009; Riise et al., 2003; Saarni et al., 2008; Valencia-Martín et al., 2013; Van Dijk et al., 2004; Volk et al., 1997), with inconsistent findings. Among young adults, results for moderate alcohol consumption suggest positive associations with HRQOL, while results for excessive alcohol intake are inconsistent. Moreover, the single study that has evaluated the association between alcohol consumption and HRQOL in older adults failed to find any association (Martinez et al., 2014).

Discrepancies across studies, especially in regards to the effects of excessive alcohol consumption on HRQOL, have been attributed to differences in populations, different classifications of alcohol intake, culturally-based variations in drinking patterns and well-being perception, or even differences in multivariate adjustment (i.e., few previous studies have adjusted for comorbid conditions) (Martinez et al., 2014; Riise et al., 2003; Volk et al., 1997).

Associations found in cross-sectional studies might reflect a non-causal relationship, so it is difficult to establish whether moderate alcohol consumption leads to better health or whether individuals who perceive their health as good tend to drink more, or even whether frequent drinking could be part of a healthy lifestyle. In line with a previous study in adults aged 30 to 60 years (Pisinger et al., 2009), our longitudinal analyses do not support an overall association between average alcohol consumption and HRQOL. Nevertheless, in a prospective study among Canadian adults aged 50 years and older who were followed during 14 years, Kaplan et al. (2012) found that moderate drinkers experienced a lower decline in HRQOL over time than lifetime abstainers and infrequent drinkers, but not than heavy drinkers. Remarkably, rates of decline in HRQOL were greater among subjects who experienced health problems and reduced their alcohol intake over time. Thus, future research should test the hypothesis that health declines may lead to reductions in alcohol intake, and this may overestimate the health benefits of alcohol consumption. Also, our results should be confirmed in studies with longer follow-up.

As regards other self-reported patterns of alcohol consumption (i.e. beverage preference, drinking with meals), we did not observe any associations. However, and in line with previous reports (Strandberg et al., 2007; Stranges et al., 2006), we recently reported a cross-sectional association between preference for spirits and worse physical HRQOL, and a link between wine or spirits consumption and better mental HRQOL, using data from 12,715

adults participating in the ENRICA study (Valencia-Martín et al., 2013). Also, individuals who drank outside of meals showed better mental HRQOL than those who drank only with meals. A possible explanation for the lack of association between these patterns of alcohol consumption and HRQOL in the present study may be the smaller sample size of older adults, or the existence of age-related differences in the study association. Interestingly, though, our prospective analyses showed that women who drank only with meals had better physical HRQOL at follow-up than those who drank only outside of meals, suggesting that this particular habit might be part of a healthy lifestyle.

Since neither beverage preference nor self-reported drinking with meals were associated with HRQOL in our study, the cross-sectional association between the MDP and better HRQOL is merely reflecting the effect of total alcohol consumption on HRQOL, so it does not add much information. In fact, both self-reported drinkers who adhered to the MDP and those who did not reported better physical HRQOL than non-drinkers.

One of the main strengths of our study is its prospective approach, which allows determination of the appropriate time sequence between alcohol consumption and HRQOL. Also, the use of a validated diet history to estimate alcohol consumption is of great importance; in fact, for alcohol consumption, the Pearson correlation coefficient between the diet history and seven 24-h recalls during one year was 0.65 (Guallar-Castillón et al., 2014). Other strength was the use of the SF-12 to assess HRQOL. This is an abbreviated version of the SF-36 questionnaire, one of the most widely used instruments to evaluate HRQOL. Despite being a short version of the SF-36 questionnaire, the SF-12 has excellent criterion validity because it explained over 90% of the variability in the PCS and MCS scores on the SF-36. The SF-12 has also shown good reliability for group comparisons (Ware, 2005). Finally, the fact that we could adjust our analyses for a large number of lifestyle and morbidity variables reduces the probability of residual confounding fully explaining the

observed results. The main limitation of the study is that, despite using a validated diet history, data on alcohol consumption were self-reported, so that there may be recall error and also social desirability bias.

5. Conclusions

In this study conducted among older adults in Spain, the small association between alcohol consumption and better physical HRQOL found at baseline was not apparent after a 3.3-year follow-up. These findings cast doubt on the conclusions of previous cross-sectional studies, and suggest that medical advice on alcohol consumption cannot be grounded on its effects on HRQL.

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Table 1. Physical and Mental Component Summary scores of the SF-12 at baseline and at follow-up, by socio-demographic, lifestyle and clinical characteristics of study participants. Results are based on 2163 community-dwelling older adults in Spain, 2008-2010.

	N	Baseline HRQOL		Follow-up HRQOL	
		PCS Mean (SD)	MCS Mean (SD)	PCS Mean (SD)	MCS Mean (SD)
Total	2163	45.7 (11.5)	52.1 (10.5)	44.5 (12.4)	52.9 (10.9)
Sex					
Men	1013	47.9 (9.9)*	54.4 (8.9)*	46.5 (11.0)*	55.4 (8.8)*
Women	1150	43.7 (12.4)	50.1 (11.3)	42.8 (13.2)	50.7 (12.1)
Age (years)					
60 to <70	1359	47.1 (10.7)*	52.3 (10.0)*	46.4 (11.5)*	53.2 (10.3)
70 to <80	683	43.7 (11.9)	51.4 (11.4)	42.0 (12.9)	51.8 (12.2)
≥80	121	40.2 (13.9)	54.7 (10.1)	38.0 (13.9)	54.8 (9.4)
Educational level					
≤ Primary	1181	43.7 (12.1)*	50.9 (11.4)*	42.4 (12.9)*	51.6 (12.0)
Secondary	529	47.8 (10.0)	53.4 (9.1)	46.7 (11.2)	54.0 (9.5)
University	453	48.4 (10.5)	53.9 (8.9)	47.6 (11.2)	54.9 (8.9)
Tobacco smoking					
Never smoker	1281	45.0 (11.8)*	51.2 (11.0)*	43.9 (12.8) *	51.5 (11.5)*
Former smoker	640	46.3 (11.0)	53.9 (9.2)	45.4 (11.7)	55.1 (9.2)
Current smoker	242	47.8 (10.6)	52.2 (10.5)	45.8 (11.8)	54.1 (10.6)
Time watching TV (h/week)					
<14	631	47.3 (10.6)*	52.6 (9.5)	45.7 (12.2) *	53.8 (9.6)*
14 to <21	668	46.9 (10.9)	52.1 (10.6)	46.1 (11.5)	52.5 (11.0)
≥21	864	43.5 (12.2)	51.8 (11.1)	42.5 (12.9)	52.4 (11.7)
Leisure physical activity (MET-h/week)[a]					
Tertile 1	661	42.5 (12.9)*	50.9 (11.7)*	41.2 (13.7)*	51.0 (12.4)*
Tertile 2	763	46.2 (11.0)	52.1 (10.1)	45.8 (11.2)	53.5 (10.0)
Tertile 3	739	48.0 (9.9)	53.3 (9.5)	47.0 (11.1)	54.2 (9.6)
Home physical activity (MET-h/week)[b]					
Tertile 1	692	43.9 (12.8)*	52.7 (10.4)*	45.4 (12.1)*	53.7 (10.3)*
Tertile 2	738	46.2 (11.0)	52.5 (10.6	46.1 (11.1)	52.8 (10.6)
Tertile 3	733	46.8 (10.4)	51.3 (10.4)	45.5 (11.2)	51.2 (11.7)
Mediterranean Diet Score (excluding alcohol)					
<3	386	44.4 (12.6)	52.4 (11.1)	43.6 (12.4)	52.8 (11.3)
3 to <5	949	46.0 (11.2)	51.6 (10.7)	45.1 (12.1)	52.4 (11.0)
≥5	828	46.0 (10.7)	52.7 (9.9	44.4 (12.7)	53.3 (10.6)
BMI (kg/m^2)					
<25	408	48.5 (9.7)*	51.5 (9.6)	48.2 (10.2)*	52.6 (9.7)
25 to <30	1068	47.1 (10.7)	52.2 (10.5)	45.3 (11.6)	53.2 (10.8)
≥30	687	41.9 (12.5)	52.4 (10.9)	41.2 (13.9)	52.5 (11.7)
Morbidity					
Cardiovascular disease[c]					
No	2049	46.2 (11.1)*	52.3 (10.3)*	45.0 (12.1)*	52.9 (10.7)*
Yes	114	35.7 (13.8)	48.9 (13.0)	36.3 (14.2)	50.5 (13.7)
Diabetes					
No	1904	46.3 (11.0)*	52.2 (10.4)	45.3 (12.0)*	53.0 (10.7)*
Yes	259	40.9 (13.5)	51.7 (11.3)	39.3 (13.8)	51.8 (12.3)
Respiratory disease[d]					
No	2006	46.2 (11.2)*	52.3 (10.2)	45.1 (12.1)*	53.0 (10.7)
Yes	157	38.5 (12.7)	50.1 (13.4)	37.8 (13.7)	50.5 (13.0)
Osteomuscular disease[e]					
No	1098	49.7 (8.8)*	53.3 (9.3)*	48.4 (9.9)*	54.1 (9.4)*
Yes	1065	41.6 (12.4)	50.9 (11.4)	40.6 (13.4)	51.5 (12.1)
Sleep apnea					
No	2083	45.9 (11.3)*	52.2 (10.3)	44.8 (12.1)*	52.8 (10.9)
Yes	80	40.3 (14.6)	50.9 (13.9)	37.5 (16.3)	54.4 (11.4)
Depression requiring treatment					
No	1987	46.1 (11.1)*	53.2 (9.6)*	45.1 (12.0)*	53.7 (10.2)
Yes	176	40.9 (13.8)	40.5 (12.5)	38.5 (14.6)	43.6 (14.1)
Disability[f]					
No	1945	46.7 (10.6)*	52.5 (10.2)*	45.1 (12.0)*	53.7 (10.2)*
Yes	218	36.7 (14.9)	49.2 (12.6)	38.5 (15.6)	43.6 (14.1)

[a] Cut-off points for tertiles: 17.5/31 in men, 12.5/22.5 in women; [b] Cut-off points for tertiles: 7.5/22.5 in men, 35.5/70 in women; [c] Ischemic heart disease, stroke and heart failure; [d] Asthma or chronic bronchitis; [e] Osteo-arthritis, arthritis and hip fracture; [f] Score ≥1 on the Lawton-Brody scale on instrumental activities of daily living (IADL).

* p<0.05, based on ANOVA tests.

Table 2. Cross-sectional association between alcohol consumption patterns and the Physical and Mental Component Summary scores of the SF-12 at baseline. Results are based on 2163 community-dwelling older adults in Spain, 2008-2012.

		Physical Component Summary		Mental Component Summary	
	N	Model 1 β coefficient (95% CI)	Model 2 β coefficient (95% CI)	Model 1 β coefficient (95% CI)	Model 2 β coefficient (95% CI)
Average alcohol consumption	**2163**				
Non-drinker	806	Ref.	Ref.	Ref.	Ref.
Ex-drinker	182	–0.06 (–1.86 to 1.75)	1.19 (–0.40 to 2.78)	–0.65 (–2.32 to 1.03)	0.02 (–1.57 to 1.62)
Moderate drinker	982	2.08 (0.96 to 3.20)**	1.59 (0.61 to 2.58)**	0.01 (–1.03 to 1.05)	–0.21 (–1.20 to 0.78)
Heavy drinker	193	2.13 (0.31 to 3.94)*	2.18 (0.57 to 3.79)**	1.80 (0.11 to 3.48)*	1.48 (–1.14 to 3.09)
Beverage preference	**1175**				
Other	382	Ref.	Ref.	Ref.	Ref.
Wine	793	–0.48 (–1.72 to 0.76)	–0.74 (–1.86 to 0.37)	0.83 (–0.32 to 1.99)	0.81 (–0.32 to 1.94)
Drinking with meals	**1175**				
Only outside of meals	171	Ref.	Ref.	Ref.	Ref.
With and outside of meals	336	0.81 (–1.04 to 2.65)	1.16 (–1.50 to 1.82)	–0.75 (–2.49 to 0.99)	–0.89 (–2.56 to 0.79)
Only with meals	668	0.79 (–0.90 to 2.47)	–0.04 (–1.57 to 1.49)	–1.08 (–2.67 to 0.50)	–1.21 (–2.75 to 0.33)
Mediterranean drinking pattern (MDP)[a]	**2163**				
Non-drinker	806	Ref.	Ref.	Ref.	Ref.
Ex-drinker	182	–0.06 (–1.86 to 1.74)	1.29 (–0.40 to 2.79)	–0.65 (–2.32 to 1.03)	0.03 (–1.57 to 1.63)
Drinker with no MDP	678	2.07 (0.82 to 3.31)**	1.89 (0.79 to 2.99)**	0.63 (–0.52 to 1.79)	0.40 (–0.71 to 1.50)
Drinker with MDP	497	2.12 (0.83 to 3.41)**	1.43 (0.30 to 2.56)*	–0.15 (–1.45 to 1.05)	–0.37 (–1.51 to 0.76)

CI: Confidence interval

[a] Moderate alcohol consumption with preference for wine and drinking only with meals.

* $p<0.05$; ** $p<0.01$.

Model 1: Linear regression model adjusted for sex, age and educational level (primary or less, secondary, university).

Model 2: As model 1 and additionally adjusted for tobacco smoking (never smoker, former smoker, current smoker), time watching TV (h/week), leisure-time physical activity (MET-h/week), household physical activity (MET-h/week), Mediterranean Diet Score (excluding alcohol), BMI (kg/m^2), cardiovascular disease, diabetes, respiratory disease, osteomuscular disease, sleep apnea, depression requiring treatment, and limitation in instrumental activities of daily living at baseline.

Table 3. Prospective association between alcohol consumption patterns at baseline and the Physical and Mental Component Summary scores of the SF-12 after a 3.3-year follow-up. Results are based on 2163 community-dwelling older adults in Spain, 2008-2012.

		Physical Component Summary		Mental Component Summary	
	N	Model 1 β coefficient (95% CI)	Model 2 β coefficient (95% CI)	Model 1 β coefficient (95% CI)	Model 2 β coefficient (95% CI)
Average alcohol consumption	**2163**				
Non-drinker	806	Ref.	Ref.	Ref.	Ref.
Ex-drinker	182	–1.81 (–3.41 to –0.21)*	–1.38 (–2.97 to 0.21)	0.61 (–1.01 to 2.22)	0.82 (–0.79 to 2.43)
Moderate drinker	982	–0.61 (–1.61 to 0.39)	–0.74 (–1.73 to 0.25)	0.25 (–0.76 to –1.25)	0.13 (–0.87 to 1.13)
Heavy drinker	193	–0.40 (–2.02 to 1.21)	–0.14 (–1.76 to 1.47)	0.14 (–1.48 to 1.76)	–0.11 (–1.75 to 1.53)
Beverage preference	**1175**				
Other	382	Ref.	Ref.	Ref.	Ref.
Wine	793	0.34 (–0.81 to 1.48)	0.22 (–0.92 to 1.36)	–0.60 (–1.75 to 0.56)	–0.51 (–1.67 to 0.65)
Drinking with meals	**1175**				
Only outside of meals	171	Ref.	Ref.	Ref.	Ref.
With and outside of meals	336	1.44 (–0.26 to 3.15)	1.37 (–0.32 to 3.06)	0.51 (–1.20 to 2.22)	0.45 (–1.27 to 2.17)
Only with meals	668	0.87 (–0.68 to 2.43)	0.69 (–0.87 to 2.24)	0.17 (–1.40 to 1.73)	0.17 (–1.41 to 1.75)
Drinking with meals in men	**757**				
Only outside of meals	114	Ref.	Ref.	Ref.	Ref.
With and outside of meals	250	1.05 (–0.92 to 3.03)	0.69 (–1.28 to 2.66)	1.05 (–0.92 to 3.03)	1.04 (–0.76 to 2.83)
Only with meals	393	0.08 (–1.79 to 1.94)	–0.58 (–2.45 to 1.30)	0.08 (–1.79 to 1.94)	1.11 (–0.60 to 2.81)
Drinking with meals in women	**418**				
Only outside of meals	57	Ref.	Ref.	Ref.	Ref.
With and outside of meals	86	2.30 (–0.97 to 5.57)	2.70 (–0.54 to 5.94)	–0.07 (–3.81 to 3.67)	–0.56 (–4.33 to 3.22)
Only with meals	275	2.93 (0.10 to 5.77)	3.64 (0.79 to 6.50)*	–0.71 (–3.96 to 2.53)	–1.26 (–4.60 to 2.07)
Mediterranean drinking pattern (MDP)[a]	**2163**				
Non-drinker	806	Ref.	Ref.	Ref.	Ref.
Ex-drinker	182	–1.81 (–3.41 to –0.21)*	–1.38 (–2.97 to 0.21)	0.60 (–1.01 to 2.21)	0.81 (–0.80 to 2.43)
Drinker with no MDP	678	–0.52 (–1.62 to 0.59)	–0.51 (–1.61 to 0.60)	–0.02 (–1.13 to 1.10)	–0.21 (–1.12 to 0.91)
Drinker with MDP	497	–0.65 (–1.79 to 0.50)	–0.82 (–1.96 to 0.31)	0.52 (–0.64 to 1.67)	0.44 (–0.71 to 1.58)

CI: Confidence interval

[a] Moderate alcohol consumption with preference for wine and drinking only with meals.

* $p<0.05$.

Model 1: Linear regression model adjusted for sex, age, educational level (primary or less, secondary, university), the Physical Component Summary score of the SF-12, and the Mental Component Summary score of the SF-12, at baseline.

Model 2: As model 1 and additionally adjusted for tobacco smoking (never smoker, former smoker, current smoker), time watching TV (h/week), leisure-time physical activity (MET-h/week), household physical activity (MET-h/week), Mediterranean Diet Score (excluding alcohol), BMI (kg/m^2), cardiovascular disease, diabetes, respiratory disease, osteomuscular disease, sleep apnea, depression requiring treatment, and limitation in instrumental activities of daily living at baseline.