Moderate alcohol consumption in older adults is associated with better cognition and well-being than abstinence

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Abstract

Background: there is evidence of a U-shaped association between alcohol consumption and physical health outcomes in older people, such that moderate drinking is associated with better outcomes than abstinence or heavy drinking, but whether moderate drinking in older people is associated with better cognition and mental health than non-drinking has not been explored.
Objective: to assess the relationship between drinking and cognitive health in middle-aged and older people.
Design: prospective observational study.
Setting/Participants: six thousand and five individuals aged 50 and over who participated in Wave 1 of the English Longitudinal Study of Ageing (ELSA) and who were not problem drinkers.
Exposure and outcome variables: we examined cognitive function, subjective well-being, and depressive symptoms, and compared the risks associated with having never drunk alcohol, having quit drinking, and drinking at <1, <2 and >2 drinks per day.
Results: for both men and women, better cognition and subjective well-being, and fewer depressive symptoms, were associated with moderate levels of alcohol consumption than with never having drunk any.
Conclusions: in middle-aged and older men and women, moderate levels of alcohol consumption are associated with better cognitive health than abstinence.

Keywords: *alcohol consumption, cognition, depression, well-being, elderly*

Introduction

As the human body ages, physiological changes occur that suggest increased sensitivity to alcohol: body water content drops and fat content increases, and because alcohol is more soluble in water, older people tend to have higher blood alcohol concentration for any given dose [1]. Evidence suggests ageing impairs the body's ability to deal with alcohol [2].

Despite this, epidemiological evidence suggests moderate levels of alcohol consumption in older people can be beneficial. In particular, moderate alcohol consumption has been found to have a protective effect on cardiovascular morbidity and mortality, where observations of a U-shaped relationship with alcohol consumption [3, 4] have been supported by large-scale meta-analyses [5].

The effects of alcohol consumption on the cognitive health of elders are less well understood. Here we focus on three aspects of this: cognitive functioning, subjective well-being, and number of depressive symptoms.

Some evidence suggests moderate alcohol consumption in older people is protective of *cognitive function* [6], but other studies have failed to find an association.

Subjective well-being is broadly defined as people's emotional and cognitive evaluations of their lives. It is increasingly recognised as an important aspect of health [7], and as separate in its effects from the absence of depression [8]. Research on the subjective well-being of elders is developing [9] but there are no existing studies of the association between the levels of alcohol consumption and subjective well-being in older people.

Depression in older people is under-recognized and under-treated [10] but is known to be associated with poorer

health outcomes, including worse outcomes following illness and increased mortality [11]. Depression has been found to be responsible for a substantial portion of disability in middle-aged and older adults, with a population attributable risk of around 20% mobility disability associated with depression [12]. Studies have identified heightened risks of depression among elders who abuse alcohol and among abstainers [13], but the effects of moderate alcohol consumption on the risks of depression in older people are uncertain.

In this study we examined levels of cognitive function, subjective well-being, and number of depressive symptoms associated with different levels of alcohol consumption in older people. Data were from the first (2002) wave of the English Longitudinal Study of Ageing (ELSA) and analyses were conducted separately for men and women. We aimed to establish whether there is evidence of higher cognitive function and better mental health associated with moderate levels of alcohol consumption in older people, compared to non-drinkers.

Methods

The ELSA sample was drawn from households that responded to the Health Survey for England (HSE) in years 1998, 1999 and 2001. Households were included in ELSA if one or more individuals living there was aged 50 or more. There were 19,924 individuals in households that responded to HSE who would have been aged 50 by the time the ELSA sample was taken in 2002, though not all these individuals participated in HSE. Two thousand five hundred six of these older individuals died or were ineligible for follow-up; of the remainder, 11,392 (65.7%) became ELSA respondents. (The final ELSA sample contained 708 additional respondents who had joined eligible households since HSE, but these do not form part of our analysis.) Analyses of socio-demographic characteristics against census results indicated that the ELSA sample remained population representative [14].

Because we only wanted to include those who did not have symptoms of problem drinking, we excluded all respondents who had scores of 2 or higher on the 4-item CAGE questionnaire [15]. The CAGE questionnaire was not asked of respondents to the 1999 HSE; only respondents who were involved in the 1998 and 2001 HSE surveys, and had CAGE scores of less than 2, were included in our analysis ($n = 7,286$; 288 individuals, 3.9% of the total, had a CAGE score of two or higher and were excluded).

Measures of alcohol consumption

HSE respondents were asked 'Do you ever drink alcohol nowadays, including drinks you brew or make at home?' For various types of alcohol, respondents who drank were asked how often they drank and on average how much they drank over the last 12 months. We calculated the mean daily alcohol consumption and categorised respondents as: non-drinkers who used to be drinkers (ex-drinkers), non-drinkers who have never been drinkers (never-drinkers), those drinking up to one drink (14 g of alcohol) per day (>0 to 1 drink/day), those drinking up to two drinks (28 g of alcohol) per day (>1 to 2 drinks/day), and those drinking more than two drinks per day (>2 drinks/day). Because of the prognostically important differences between non-drinkers and ex-drinkers [6], the reference category was >0 to 1 drink per day.

Outcome measures

Outcome measures were:

- *Cognitive function*: Based on three items: word recall (mean of immediate and delayed of a 10-word recall list, score out of 10); numerical reasoning (score out of 4); being able to correctly specify the date (day, date, month, year; score out of 4) [16]. Total score was out of 18.
- *Subjective well-being*: Calculated using the Control, Autonomy, Self-realisation and Pleasure (CASP-19) 19-item quality of life measure [17]. Items were scored 3/2/1/0 to give a score out of 57.
- *Depressive symptoms*: Number of depressive symptoms was measured using a version of the Center for Epidemiologic Studies Depression Scale (CES-D) [18]. ELSA uses a subset of eight items out of the original twenty, as in the Established Populations for Epidemiologic Study of the Elderly (EPESE) survey [19]. Items were coded dichotomously (yes/no) to give a score out of 8. A higher CES-D score is not necessarily diagnostic of depression but indicates more depressive symptoms.

The scoring of our outcome measures differed, so to enable comparison we standardised each of them using z-scores.

Statistical analysis

We used linear regression analysis to estimate the effects of the level of alcohol consumption on cognitive function, subjective well-being, and number of depressive symptoms. The primary sampling unit in HSE is the household; we used cluster correction to take into account anticipated similarity between individuals living in the same household, and survey weights were used. Analysis was conducted using Stata SE Version 8.2.

We included in our analysis the following socio-demographic factors known to influence our outcomes of interest [20]: age; gender; education level, categorised by years of education: (≤9; 10 to 13; ≥14); income (including income from employment, self-employment, private or state pension, benefits, assets, and other sources); household wealth (including financial, physical, and housing wealth, but not pension wealth); exercise (taking part in vigorous sports or activities once a week or more, taking part in moderately energetic sports or activities once a week or more, and exercising at below this level).

We also controlled for the following medical history and lifestyle variables that have been associated with cognitive function, well-being, and depression in older adults [20, 21]: body mass index (measured by a nurse who measured height and weight, and categorized as low or normal, BMI <25; overweight, BMI 25 to <30; obese, BMI ⩾30); cigarette smoking (never smoked, ex-smoker, current smoker); co-morbidity [0, 1, and 2 or more instances of being told by a doctor that they had a stroke, high blood pressure, diabetes, arthritis, dementia, or heart condition (heart attack, coronary heart disease, angina, congestive heart failure, other heart problem)]; number of close family members (none, 1 or 2, 3 or 4, and 5 or more); number of close friends (none, 1 or 2, 3 or 4, and 5 or more).

Results

Table 1 shows baseline characteristics of study participants. Among both male and female drinkers, the average daily alcohol intake was of one drink per day or less. More women than men were non-drinkers; more than one in five men, but fewer than one in twenty women, reported drinking an average of more than two drinks per day.

Table 2 shows mean levels of our outcome measures in relation to the level of alcohol consumption. Higher cognitive function and subjective well-being scores indicate better functioning, while a higher CES-D score indicates more depressive symptoms. Overall, men had better outcomes

(higher cognitive function and well-being, fewer depressive symptoms) than women. In relation to levels of alcohol consumption, the best outcomes for men were among those drinking more than two drinks per day; the best outcomes for women were for those drinking more than one, but less than two drinks per day. For cognitive function and well-being, those drinking in the >1 to 2 drinks per day category had significantly better outcomes than those who were non-drinkers. Among non-drinkers, there were no significant differences between those who had quit drinking and those who had never drunk.

We calculated estimates using regression analysis separately by gender and adjusted for controls as specified above. The reference category was >0 to 1 drink/day. Table 3 shows the outcomes of regressing the z-scores of our standardised outcomes on level of alcohol consumption. For all categories there are significantly better outcomes associated with both categories of non-drinkers when men and women are combined, and for all categories there are significantly better outcomes associated with drinking >1 to 2 drinks per day than with drinking >0 to 1 drink per day. For subjective well-being the worst outcomes are associated with never-drinkers, but numbers are too small to fully assess the difference between ex-drinkers and never-drinkers. Our results indicate little difference between men and women: for both sexes, compared to those drinking >0 to 1 drink per day, those who do not drink alcohol perform significantly worse and those

Table 1. Characteristics of study subjects by socio-demographic characteristics and health status

		ELSA baseline data		
		Men (%) $n = 3,409$	Women (%) $n = 3,877$	*P*-values
Mean age at baseline		61.7	63.0	0.000
Co-morbidity: mean number of illnesses		0.21	0.18	0.005
BMI	Mean	27.7	27.5	0.089
Close family	Mean number	1.06	1.44	0.000
Close friends	Mean number	2.13	2.08	0.664
Years of full-time education	0−9	793 (23.3)	823 (21.2)	0.000
	10−13	2,060 (60.4)	2,566 (66.2)	
	14+	468 (13.7)	401 (10.3)	
	Missing	88 (2.6)	87 (2.2)	
Smoking	Never smoked	972 (28.5)	1,687 (43.5)	0.000
	Ex-smoker	1,845 (54.1)	1,442 (37.2)	
	Current smoker	592 (17.4)	747 (19.3)	
	Missing	0 (0.0)	1 (0.0)	
Alcohol consumption (average drinks/day)	0 (ex-drinkers)	87 (2.6)	147 (3.8)	0.000
	0 (never drank)	46 (1.4)	153 (4.0)	
	>0 to 1	1,735 (50.9)	2,902 (74.9)	
	>1 to 2	799 (23.4)	529 (13.6)	
	>2	739 (21.7)	143 (4.0)	
	Missing	3 (0.1)	3 (0.1)	

Note: Percentages may not sum to 100 because of rounding.
One drink is equal to 14 g of alcohol.

Table 2. Cognitive and mental health scores at follow-up by baseline level of alcohol intake

| | | Cognitive scores at follow-up by baseline measures of alcohol consumption | | |
		Cognition (score out of 18) (95% CI)	Well-being (CASP-19: score out of 57) (95% CI)	Depression (CES-D: score out of 8) (95% CI)
Weighted				
Men				
Average number of drinks/day	0 (ex-drinkers)	9.14 (8.53, 9.76)	39.21 (36.64, 41.78)	1.67 (1.28, 2.06)
	0 (never drank)	9.34 (8.51, 10.17)	38.28 (34.80, 41.77)	1.29 (0.75, 1.82)
	>0 to 1	10.48 (10.34, 10.61)	41.93 (41.48, 42.38)	0.95 (1.19, 1.36)
	>1 to 2	11.08 (10.89, 11.27)	43.81 (43.26, 44.38)	1.05 (0.84, 1.06)
	>2	11.15 (10.95, 11.34)	44.03 (43.38, 44.69)	1.29 (0.93, 1.17)
	Total	10.71 (10.61, 10.81)	42.74 (42.43, 43.05)	1.16 (1.10, 1.22)
Women				
Average number of drinks/day	0 (ex-drinkers)	9.46 (9.02, 9.91)	40.18 (38.44, 41.93)	2.06 (1.70, 2.42)
	0 (never drank)	9.11 (8.65, 9.57)	39.34 (37.61, 41.06)	2.10 (1.74, 2.46)
	>0 to 1	10.30 (10.18, 10.41)	43.28 (42.95, 43.62)	1.59 (1.51, 1.66)
	>1 to 2	11.12 (10.90, 11.35)	44.75 (44.04, 45.47)	1.48 (1.32, 1.64)
	>2	10.99 (10.57, 11.41)	44.09 (42.52, 45.67)	1.59 (1.24, 1.95)
	Total	10.35 (10.25, 10.45)	43.26 (42.97, 43.55)	1.62 (1.55, 1.68)

Note that higher cognition and well-being scores indicate better functioning, whereas a higher CES-D score indicates a greater number of depressive symptoms.

who drink >1 to 2 drinks per day perform significantly better. In no category do those who drink >2 drinks per day perform worse than those who drink >0 to 1 drink per day.

As a sensitivity analysis we repeated our regression omitting those who reported that they had been told by a doctor that they had dementia, Alzheimer's, organic brain disease or senility. The total numbers were small ($n = 63$) and omitting these individuals made no change to our overall findings (results available from authors on request). To assess the effects of alcohol consumption on the different components of the cognitive function test we reran our model using the z-scores for each of the components (recall, numerical reasoning, orientation) separately. We found significant effects for the recall and numerical reasoning components but not for orientation (results available from authors on request).

Discussion

Studies of physical function in older people have failed to find an increase in the risk of negative outcomes associated with moderate alcohol consumption. Our results indicate a similar relationship between older people's moderate alcohol consumption and their cognitive function, subjective well-being, and number of depressive symptoms. We found evidence of lower levels of cognition and well-being and more depressive symptoms in older people who abstained from alcohol, compared to those consuming no more than one drink per day. In contrast, in those older people who drank >1 to 2 drinks per day there were statistically significantly higher levels of cognition and well-being, and

fewer depressive symptoms, than in those consuming no more than one drink per day.

We should bear in mind a number of methodological issues. First, we have excluded problem drinkers and alcohol abusers from our analysis. It remains important to identify those who have problems with alcohol and to ensure they receive suitable treatment. We have not explicitly excluded binge drinkers from our analysis, but levels of binge drinking are generally found to be low in older people [22].

Second, we do not take account of those on psychotropic medications or estrogens, both known to alter cognitive function, nor those who have had coronary artery surgery. Our data do not include those in institutions, where cognitive health problems and use of interacting medications are relatively common. Heavier and excessive alcohol consumption are linked to trauma and a range of cardiovascular, neurological and gastrointestinal diseases as well as certain cancers [23].

Third, assessing alcohol intake is complex and older individuals may be inaccurate reporters, unfamiliar with standard measures of intake [24]. However, a tendency to under-report alcohol consumption would mean the true risks in the moderate range would be below our estimates and this is not likely to undermine our findings. In general, self-reports of alcohol consumption are taken to be valid for the purposes of classifying drinkers into broad consumption bands [25].

Finally, although our cognitive outcome is not unidimensional, there are aspects of cognitive performance it does not cover. Our results show a significant association of moderate alcohol consumption with recall and numerical reasoning, but no significant association with orientation. It is possible

Table 3. Outcomes of linear regression of z-scores of cognitive outcomes on level of alcohol consumption, by gender, with controls

		Alcohol consumption in 1998/9 (mean drinks/day)			
		0 (all ex-drinkers)	0 (never-drinkers)	>1 to 2	>2
	Men	−0.35** (−0.60, −0.10)	−0.25 (−0.60, 0.10)	0.15*** (0.06, 0.21)	0.12** (0.03, 0.21)
Cognitive function	Women	−0.15 (−0.31, 0.01)	−0.12 (−0.29, 0.05)	0.12** (0.03, 0.21)	0.14 (−0.03, 0.31)
	Both	−0.23** (−0.37, −0.09)	−0.16* (−0.32, 0.00)	0.14*** (0.08, 0.20)	0.13** (0.05, 0.21)
Well-being (CASP-19)	Men	−0.17 (−0.52, 0.17)	−0.58** (−0.95, −0.21)	0.14** (0.05, 0.23)	0.13* (0.03, 0.23)
	Women	−0.28* (−0.50, −0.06)	−0.42*** (−0.64, −0.20)	0.10* (0.00, 0.20)	0.00 (−0.21, 0.20)
	Both	−0.24*** (−0.45, −0.04)	−0.47*** (−0.67, −0.26)	0.12*** (0.05, 0.19)	0.09* (0.00, 0.19)
Depression	Men	0.26* (0.02, 0.51)	0.12 (−0.13, 0.37)	−0.13** (−0.21, −0.05)	0.00 (−0.09, 0.10)
	Women	0.20 (−0.02, 0.42)	0.31** (0.08, 0.54)	−0.02 (−0.13, 0.09)	0.00 (−0.21, 0.22)
	Both	0.23** (0.06, 0.39)	0.27** (0.08, 0.46)	−0.08* (−0.15, −0.02)	0.02 (−0.06, 0.11)

Reference category = drinking >0 to 1 drink per day

Analyses controlled for: age; gender; BMI; education level; smoking; co-morbidity; income; household wealth; participation in moderate or vigorous exercise; number of close family members; number of close friends.

that alcohol consumption may have negative consequences on aspects of cognitive function that are beyond the scope of this study.

The mechanism by which alcohol consumption in older people is related to cognitive health outcomes is unclear. Alcohol is known to be protective of cardiovascular health [3, 4], and cardiovascular disease is known to be associated with cognitive impairment [26], so it may be that the effect of alcohol on cognitive health operates via cardiovascular health. Moderate levels of alcohol consumption are often associated with socializing and it may also be that the associations we have identified relate to effects of social interaction other than those identified in our model. If present, this relationship may contribute to the associations we have found between moderate alcohol consumption and better well-being, and moderate alcohol consumption and fewer depressive symptoms. Cognitive impairment is known to increase the risk of depression [27], but the current study does not enable us to examine this relationship, and the role of alcohol in it, in any greater detail. Further research is needed to tease out the details of how alcohol consumption influences cognitive health in the ways we have highlighted.

Older people in the United Kingdom and elsewhere are often recommended to drink less than younger adults (for the United Kingdom, see: [28]; US: [29]; Italy: [30]). Such recommendations for lower alcohol consumption in older people are challenged by epidemiological findings that alcohol consumption upto and including two drinks per day is not associated with excess risk of cognitive health problems and may even be protective.

However, we do not advocate an increase in drinking among older people. Marmot and Brunner [31] observing the population theory of alcohol consumption [32, 33] suggest that any increase in mean alcohol consumption will tend to increase the prevalence of problem drinking. The health risks associated with drinking are not related only to quantity but may also relate to time of day,

drinking before driving, for example, which is always inadvisable.

Conclusion

Results from a nationally representative study suggest that community-dwelling older people who consume moderate levels of alcohol (up to two drinks per day) and who are not problem drinkers have better cognitive function and subjective well-being, and fewer depressive symptoms, than those who do not drink alcohol. In terms of cognition and mental health, both men and women appear to benefit from moderate levels of alcohol consumption.

Key points

- Moderate alcohol consumption is known to be associated with better mortality and physical function outcomes in older adults, but its relationship with cognitive and mental health is uncertain.
- We found that drinking at moderate levels is associated with better cognition, better well-being, and fewer depressive symptoms in middle-aged and older people.
- Amongst older people, both those who have quit drinking and those who have never drunk alcohol experience poorer cognition and well-being outcomes than those who are moderate drinkers.

Conflict of Interest

None

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