

What is the relationship between alcohol intake and cognitive decline with age?

Conclusion

Moderate evidence suggests that compared to non-drinkers, individuals who drink moderately have a slower cognitive decline with age. (Grade: Moderate)

Although limited, evidence suggests that heavy or binge drinking is detrimental to age-related cognitive decline. (Grade: Limited)

Grade: Moderate; Limited

Overall strength of the available supporting evidence: Strong; Moderate; Limited; Expert Opinion Only; Grade not assignable For additional information regarding how to interpret grades, [click here](#).

Evidence Summary Overview

Several of the prospective cohort studies (Bond et al, 2005; Deng et al, 2006; Stott et al, 2008; and Wright et al, 2006) found similar results that appear to indicate light to moderate drinking decreases the risk of or lessens the severity of dementia and cognitive decline, especially compared to non-drinkers. Solfrizzi et al, 2007 found no significant (NS) associations between any levels of drinking and the incidence of mild cognitive impairment in non-cognitively impaired individuals vs. abstainers.

In regards to type of alcohol, Deng et al, 2006 found light-to-moderate intake of wine and liquor were related with a reduced risk of dementia compared to non-drinkers, while light-to-moderate intake of beer was associated with a significantly higher risk of dementia than non-drinkers. Mehlig et al, 2008 found that wine was protective for dementia and the association was strongest among women who consumed wine only. Consumption of spirits at baseline was associated with slightly increased risk of dementia.

By gender, Bond et al, 2005 found NS difference in cognitive function, while Stott et al, 2008 found that cognitive function was better for female drinkers than non-drinkers for some cognitive tests. However, no statistically significant differences were found in baseline cognitive function between male drinkers and non-drinkers.

Evidence Summary Paragraphs

Systematic Review/Meta-Analysis

Peters et al, 2008 (positive quality), a systematic review and meta-analysis of 23 studies, evaluated the evidence for any relationship between incident cognitive decline or dementia in the elderly and alcohol consumption. The majority of the studies were from Europe and North America and Canada. In older people, small to moderate amounts of alcohol consumption were associated with reduced incidence of dementia and Alzheimer's disease. Small amounts of alcohol may be protective against dementia (random effects model, RR=0.63, 95% CI: 0.53 to 0.75) and Alzheimer's disease (RR=0.57, 95% CI: 0.44 to 0.74) but not for vascular dementia (RR=0.82, 95% CI: 0.50 to 1.35) or

cognitive decline ($R=0.89$, 95% CI: 0.67 to 1.17). The evidence is strongest for wine consumption, but it is not conclusive.

Primary Studies

Bond et al, 2005 (neutral quality), a prospective cohort study conducted in the US, investigated the longitudinal relationship between alcohol consumption and cognitive performance in a cohort of 1,624 Japanese American older adults. Structured interviews were conducted at baseline and follow-up every two years for an eight-year period; a questionnaire asked about current and past alcohol patterns by beverage type (beer, wine, sake or liquor), as well as frequency, quantity and number of consumption years. Current alcohol consumers scored significantly higher on the Cognitive Abilities Screening Instrument (mean rate of change of -1.22 CASI units) over the eight-year follow-up period than past consumers or abstainers (mean rate of change of -3.77 CASI units) ($P<0.05$).

Deng et al, 2006 (neutral quality), a prospective cohort study conducted in China, examined the relationship between alcohol intake and dementia and whether this association depended on age, gender, educational level or cigarette smoking. Dementia screening and diagnosis, as well as frequency and quantity of alcohol consumption, were measured at baseline and the two-year follow-up. A total of 2,632 older adults were included in the analysis. Light-to-moderate drinking was associated with a significantly lower risk of dementia compared with non-drinking, while excessive drinking was related to a higher risk of dementia. The effect of light-to-moderate drinking seemed most prominent among vascular dementia, $OR=0.63$ (95% CI: 0.55 to 0.72) for Alzheimer's disease, $OR=0.31$ (95% CI: 0.19 to 0.51) for vascular dementia and $OR=0.45$ (95% CI: 0.12 to 1.69) for other dementia. Light-to-moderate intake of wine and liquor were related with a reduced risk of dementia compared to non-drinkers, while light-to-moderate intake of beer was associated with a significantly higher risk of dementia than non-drinkers.

Mehlig et al, 2008 (neutral quality), the cohort Prospective Population Study of Women in Goteborg, Sweden, assessed the association between different types of alcoholic beverages and 34-year incidence of dementia. Frequency of alcohol intake was recorded and related to dementia at baseline (1968 to 1969, $N=1,462$) and at four other timepoints between 1974 and 2002. By 2002, 164 cases of dementia were diagnosed. Wine was protective for dementia ($HR=0.6$, 95% CI: 0.4, 0.8) in the updated model, and the association was strongest among women who consumed wine only ($HR=0.3$, 95% CI: 0.1, 0.8); the protective association of wine was stronger among smokers. Consumption of spirits at baseline was associated with slightly increased risk of dementia ($HR=1.5$, 95% CI: 1.0, 2.2).

Ngandu et al, 2007 (neutral quality), the prospective cohort Cardiovascular Risk Factors, Aging and Dementia (CAIDE) Study conducted in Finland, investigated whether midlife alcohol drinking is associated with cognitive function later on in a non-demented population of elderly persons. The average follow-up period was 21 years. A random sample of 2,000 survivors aged 65 to 79 years in 1997 were invited for re-examination in 1998. A total of 1,409 completed re-examination and 68 were excluded due to the diagnosis of dementia, leaving 1,341 subjects in the analysis. A baseline self-administered questionnaire asked for details on frequency of drinking (never, infrequently, or frequently). About 30% of the participants never drank alcohol, 40% drank it infrequently and 30% drank frequently. Participants who did not drink alcohol at mid-life had a poorer performance in episodic memory, psychomotor speed and executive function in late life compared with infrequent and frequent drinkers, after adjustment for sociodemographic and vascular factors, while late-life drinkers had poorer psychomotor speed and executive function.

Solfrizzi et al, 2007 (positive quality), a prospective cohort study conducted in Italy, examined the

impact of alcohol consumption on the incidence of mild cognitive impairment and its progression to dementia in 1,445 non-cognitively impaired participants (630 women, 815 men) aged 65 to 84 years participating in the Italian Longitudinal Study on Aging, with a 3.5-year follow-up. Food frequency (FFQ) and screening questionnaires were used to assess alcohol consumption and health status. Analysis included blood samples and the Mini-Mental State Examination. Analyses were controlled for age and gender and adjusted for education, smoking, coronary artery disease and type 2 diabetes, hypertension, stroke and total cholesterol. Results showed that persons with mild cognitive impairment who were moderate drinkers (less than one drink a day) had a lower rate of progression to dementia than non-drinkers [hazard ratio (HR) 0.15; 95% CI: 0.03 to 0.78]. Also, moderate drinkers with mild cognitive impairment who consumed less than one drink a day of wine showed significantly lower rate of progression to dementia than non-drinkers (HR 0.15; 95% CI: 0.33 to 0.77). No significant association between higher levels of drinking (one or more drink a day) and rate of progression to dementia in patients with mild cognitive impairment vs. non-drinkers. No significant associations were found between any levels of drinking and the incidence of mild cognitive impairment in non-cognitively impaired individuals vs. non-drinkers. Authors concluded that in people with mild cognitive impairment, consuming up to one drink a day of alcohol or wine may decrease the rate of progression to dementia.

Stott et al, 2008 (neutral quality), a prospective cohort study in Ireland, Netherlands and Scotland investigated whether low to moderate alcohol intake was protective against cognitive decline in older people (N=5,804; 3,000 women, 2,804 men) aged 70 to 82 years with vascular risk factors or known vascular disease randomized to pravastatin or placebo in the Prospective Study of Pravastatin in the Elderly at Risk. Alcohol intake was assessed one time at baseline and quantified in terms of usual alcohol intake in units per week for the previous month. Cognitive function was measured using the Mini-Mental State Examination (MMSE), speed of information processing (Stroop and Letter-Digit Coding tests [LDCT]) and immediate and delayed memory (Picture-Work Learning test [PWLT]) over 3.2 years. Results showed cognitive performance was better for female drinkers than non-drinkers for all cognitive tests over the 3.2-year follow-up. However, when adjusted for potential confounders, results remained statistically significant only for the LDCT ($P < 0.001$) and delayed recall in the PWLT ($P = 0.001$), with borderline significance for the MMSE ($P = 0.05$). No statistically significant differences were found in baseline cognitive function between male drinkers and non-drinkers. The rate of cognitive decline was similar for drinkers and non-drinkers for all cognitive tests, except for MMSE, which declined significantly less in female drinkers than non-drinkers (linear mixed model attenuated rate of decline = 0.05 MMSE units per year, $P = 0.001$). The authors concluded that drinking low to moderate amounts of alcohol may delay age-associated cognitive decline in older women; however, these benefits were not evident in older men. Limitations of this study include no data on the type of alcohol consumed or lifetime alcohol consumption and the relatively short follow-up time of 3.2 years to assess cognitive decline.

Wright et al, 2006 (positive quality), a prospective cohort study conducted in the US examined the effect of alcohol intake on cognitive performance over time in a younger, multi-ethnic, community-based sample (N=1,428; 43% of initial N) participating in the Northern Manhattan Study. The study also examined the role of the APOE-4 allele. Participants were 40 or more years with mean age of 71 years, with 62% Hispanic, 19% black and 19% white. Data were collected through telephone interviews, physical and neurological examinations, review of medical records and fasting blood samples. Alcohol intake (average amount consumed in past year and during drinking lifetime) was assessed using a structured interview adapted from a food frequency questionnaire. Results showed a positive relationship between reported alcohol intake and cognition. Drinking less than one drink a week ($P = 0.09$), between one drink weekly up to two drinks daily ($P = 0.001$), and more than two drinks daily ($P = 0.003$) were associated with less

cognitive decline on the modified Telephone Interview for Cognitive Status compared to never drinkers. The dose-response relationship was not changed by the presence of an APOE-4allele in a sub-sample.

[View table in new window](#)

Author, Year, Study Design, Class, Rating	Population/Subjects	Significant Outcomes
<p>Bond GE et al 2005</p> <p>Study Design: Prospective Cohort Study</p> <p>Class: B</p> <p>Rating: </p>	<p>N=1,624 Japanese American older adults.</p> <p>Duration: Eight years.</p> <p>Location: United States.</p>	<p>Current alcohol consumers (N=480) scored significantly higher (P<0.05) on the Cognitive Abilities Screening Instrument (mean rate of Δ of 1.22 CASI units) than past consumers or abstainers (N=1,144, mean rate of Δ of -3.77 CASI units).</p>
<p>Deng et al 2006</p> <p>Study Design: Prospective Cohort Study</p> <p>Class: B</p> <p>Rating: </p>	<p>N=2,632 older adults.</p> <p>Duration: Two years.</p> <p>Location: China.</p>	<p>Light-to-moderate drinking associated with a significantly ↓ risk of dementia, compared with non-drinking, while excessive drinking related to a ↑ risk of dementia.</p> <p>Effect of light-to-moderate drinking seemed most prominent among vascular dementia, 0.63 (0.55 to 0.72) for Alzheimer's disease, 0.31 (0.19 to 0.51) and for vascular dementia and 0.45 (0.12 to 1.69) for other dementia.</p> <p>Light-to-moderate intake of wine/liquor related with ↓ risk of dementia compared to non-drinkers, while light-to-moderate intake of beer associated with significantly ↑ risk of dementia than non-drinkers.</p>
<p>Mehlig et al 2008</p> <p>Study Design: Prospective Cohort Study</p>	<p>Participants from the Prospective Population Study of Women in Goteborg, Sweden.</p> <p>Frequency of alcohol intake recorded and related to dementia at baseline (1968 to 1969, N=1,462), as well as in</p>	<p>By 2002, 164 cases of dementia were diagnosed.</p> <p>Wine was protective for dementia (HR=0.6; 95% CI: 0.4, 0.8) in the updated model.</p> <p>Association strongest among women who consumed wine only (HR=0.3, 95% CI: 0.1,</p>

<p>Solfrizzi V, D'Introno A et al, 2007</p> <p>Study Design: Prospective Cohort Study</p> <p>Class: B</p> <p>Rating: </p>	<p>N=1,445 non-cognitively impaired participants (630 women; 815 men) aged 65 to 84 years participating in Italian Longitudinal Study on Aging.</p> <p>Duration: 3.5-year follow-up.</p> <p>Location: Italy.</p>	<p>Patients with mild cognitive impairment who were moderate drinkers (i.e., those who consumed <one drink a day (~15g of alcohol), had a ↓ rate of progression to dementia than abstainers (HR 0.15; 95% CI: 0.03 to 0.78).</p> <p>Moderate drinkers with mild cognitive impairment who consumed <one drink a day of wine showed a significantly ↓ rate of progression to dementia than abstainers (HR 0.15; 95% CI: 0.03 to 0.77).</p> <p>NS association between ↑ levels of drinking (≥one drink a day) and rate of progression to dementia in patients with mild cognitive impairment vs. abstainers.</p> <p>NS associations found between any levels of drinking and incidence of mild cognitive impairment in non-cognitively impaired individuals vs. abstainers.</p>
<p>Stott DJ, Falconer A et al, 2008</p> <p>Study Design: Prospective Cohort Study</p> <p>Class: B</p> <p>Rating: </p>	<p>N=5,804 (3,000 women; 2,804 men) aged 70 to 82 years with vascular risk factors or known vascular disease participating in Prospective Study of Pravastatin in the Elderly at Risk.</p> <p>Duration: 3.2-year follow-up.</p> <p>Location: Ireland, Netherlands and Scotland.</p>	<p>Cognitive function better for female drinkers than non-drinkers for all cognitive tests over the 3.2-year follow-up.</p> <p>When adjusted for potential confounders, results remained statistically significant only for LDCT (P<0.001) and delayed recall in PWLT (P=0.001), with borderline significance for MMSE (P=5.05).</p> <p>NS differences found in baseline cognitive function between male drinkers and non-drinkers.</p> <p>Rate of cognitive decline similar for drinkers and non-drinkers for all cognitive tests, except for MMSE, which ↓ significantly less in female drinkers than non-drinkers (linear mixed model attenuated rate of ↓ = 0.05 MMSE units per year, P=0.001).</p>
<p>Wright CB, Elkind MS et al, 2006</p> <p>Study Design:</p>	<p>N=1,428; 43% of initial N were aged ≥40 years (mean age 71 years), participating in Northern Manhattan Study.</p> <p>62% Hispanic, 19% black and</p>	<p>Positive relationship between reported alcohol intake and cognition.</p> <p>Drinking <one drink a week (P=0.09), between one drink weekly, up to two drinks daily (P=0.001), and >two drinks daily</p>

Prospective Cohort Study	19% white.	(P=0.003) associated with ↓ cognitive decline, compared to never drinkers.
Class: B	Duration: Mean follow-up 2.2 years; range 0.5 to 4.4 years.	No Δ in dose-response relationship by the presence of an APOE-4 allele.
Rating: 	Location: United States.	

Research Design and Implementation Rating Summary

For a summary of the Research Design and Implementation Rating results, [click here](#).

Worksheets

 [Bond GE, Burr RL, McCurry SM, Rice MM, Borenstein AR, Larson EB. Alcohol and cognitive performance: a longitudinal study of older Japanese Americans. The Kame Project. The Kame Project. *Int Psychogeriatr*. 2005 Dec;17\(4\):653-68. Epub 2005 Sep 27.](#)

 [Deng J, Zhou DH, Li J, Wang YJ, Gao C, Chen M. A 2-year follow-up study of alcohol consumption and risk of dementia. *Clin Neurol Neurosurg* 2006;108\(4\):378-383.](#)

 [Mehlig K, Skoog I, Guo X, Schütze M, Gustafson D, Waern M, Ostling S, Björkelund C, Lissner L. Alcoholic beverages and incidence of dementia: 34-year follow-up of the prospective population study of women in Goteborg. *Am J Epidemiol*. 2008 Mar 15;167\(6\):684-91. Epub 2008 Jan 24.](#)

 [Ngandu T, Helkala EL, Soininen H, Winblad B, Tuomilehto J, Nissinen A, Kivipelto M. Alcohol drinking and cognitive functions: findings from the Cardiovascular Risk Factors Aging and Dementia \(CAIDE\) Study. *Dementia and Geriatric Cognitive Disorders*. 2007;23:140-149.](#)

 [Peters R, Peters J, Warner J, Beckett N, Bulpitt C. Alcohol, dementia and cognitive decline in the elderly: a systematic review. *Age and Ageing*. 2008 Sep;37\(5\):505-12. Epub 2008 May 16.](#)

 [Solfrizzi V, D'Introno A, Colacicco AM, Capurso C, Del Parigi A, Baldassarre G, Scapicchio P, Scafato E, Amodio M, Capurso A, Panza F; Italian Longitudinal Study on Aging Working Group. Alcohol consumption, mild cognitive impairment and progression to dementia. *Neurology*. 2007 May 22; 68 \(21\): 1,790-1,799.](#)

 [Stott DJ, Falconer A, Kerr GD, Murray HM, Trompet S, Westendorp RG, Buckley B, de Craen AJ, Sattar N, Ford I. Does low to moderate alcohol intake protect against cognitive decline in older people? *J Am Geriatr Soc*. 2008; 56\(12\): 2,217-2,224.](#)

 [Wright CB, Elkind MS, Luo X, Paik MC, Sacco RL. Reported alcohol consumption and cognitive decline: the northern Manhattan study. *Neuroepidemiology*. 2006; 27: 201-207.](#)