

Fruit juice, brain health and cognitive function

Key points

- Brain health – the wellness of our brain structure – and cognitive function – how well our brain operates – are vital for quality of life as we age.
- Intervention studies have found that 100% fruit juice (FJ) consumption can improve markers of cognitive function and depression.
- Observational studies show that FJ consumption is associated with reduced anxiety symptoms, dementia risk, and mortality from Parkinson's disease.
- FJ does not appear to reduce memory performance and mental health in contrast to sugar-sweetened beverages (SSB).
- The benefits to brain and cognitive health may be due to natural bioactive compounds in FJ including vitamin C, folate and polyphenols.

Setting the scene

The World Health Organisation (WHO) defines brain health as a “*state of brain functioning across cognitive, sensory, social-emotional, behavioural and motor domains, allowing a person to realize their full potential over the life course, irrespective of the presence or absence of disorders*”¹.

The prevalence of Alzheimer's disease and dementia in Europe is projected to double by 2050 – increasing from 7.8 to over 14 million^{2,3}. Most of the increase is due to ageing populations but diet and lifestyle are also important⁴.

Fruit Juice: What's Inside

Several different compounds in FJ could potentially affect brain health and cognitive function. These are vitamin C, folate, potassium and polyphenols, particularly the flavanones hesperidin, naringin and narirutin. FJ provides up to 26% of vitamin C consumed in European populations.

Fruit polyphenols could improve brain function by improving blood flow and promoting compounds which stimulate brain cells (neurons) to grow and adapt⁵. One such compound is brain-derived neurotrophic factor (BDNF) which is a protein made by the brain. BDNF is used to form and strengthen the connections between brain cells which makes it essential for learning and memory⁶.

Preclinical trials⁷ suggest that citrus flavonoids, found in oranges, grapefruit and their juices, have neuroprotective anti-inflammatory actions which benefit brain health. One type of flavonoid, called hesperidin, can reduce neuroinflammation and cell death, and enhance neural growth factors and antioxidant defences⁸.

EU and UK authorised health claims state that vitamin C helps to protect cells from oxidative stress whilst folate helps maintain normal psychological function⁹.

Cognitive function

Cognitive function is the ability to learn, retain, manipulate and recall information^{10,11}. It includes processes related to attention, decision making and memory^{8,9}. The following sections will discuss brain health and cognitive function alongside several underlying conditions, including Alzheimer's disease, Parkinson's disease, dementia, depression, and anxiety.

Systematic reviews and meta-analyses

These types of reviews consolidate evidence from intervention trials or large observational studies. A large systematic review and meta-analysis of randomised controlled trials¹² found that certain fruit forms such as blueberry juice concentrate, cherry juice, cranberry juice, grape juice and orange juice improved cognitive health. This needs to be confirmed with larger studies using similar cognitive tests.

Another systematic review of 28 epidemiological or experimental studies¹³ found that flavonoids and other polyphenols could lead to small cognitive benefits, with berry juice appearing most beneficial for immediate verbal memory.

Randomised controlled trials

Improvements in measures of cognition and brain function have been found after fruit juice consumption. These include:

- Increased cerebral blood flow
- Improved attention and processing speed
- Better working memory and reaction time
- Reduced symptoms of depression
- Reduced mental fatigue
- Improved spatial awareness.

Cognitive function

A randomised, placebo-controlled crossover trial¹⁴ in healthy young adults (18–30 years) who consumed 500 ml of a flavanone-rich citrus juice found improved short-term performance using the Digit Symbol Substitution Test (a measure of attention, working memory, and processing speed). This was measured 2 hours after consuming the juice and compared with a flavanone-free control beverage. An increase in cerebral blood flow was also seen after the FJ.

Other research¹⁵ with healthy young adults (average age 21 years) found that drinking 230ml of purple grape juice significantly improved attention reaction time 20 minutes later. Similarly, in another¹⁶ trial, healthy, middle-aged males (30-65 years) were asked to drink flavonoid-rich orange juice (240ml; 272mg flavanones). Over the next 6 hours, both self-reported and measured cognition improved compared to the energy-matched control drink.

An 8-week trial¹⁷ with healthy older adults (average age 67 years) found that daily consumption of 500ml high-flavanone (205mg), orange juice significantly improved overall cognitive abilities compared with a cordial control.

Depressive disorder

Several randomised trials have examined the effects of various types of FJ on depressive disorder – a debilitating condition which affects cognitive function. One trial comprising 40 young adults with depressive disorder found that 190ml of flavonoid-rich orange juice (3x daily over 8-weeks) improved depressive symptoms as well as gut levels of *Butyricoccus pullicaecorum* – a ‘good’ bacteria. It is thought that favourable species of gut bacteria influence the brain by acting via the ‘gut-brain axis’ – a two-way communication network linking the gut and the brain¹⁸.

Another publication¹⁹ found that 380ml of flavonoid-rich orange juice (600mg flavonoids) also consumed daily over 8-weeks increased the abundance of beneficial gut bacteria from the *Lachnospiraceae* family in young adults with depressive symptoms. Levels of these beneficial bacteria also correlated with levels of brain-derived neurotrophic factor.

Mental fatigue and hangover recovery

In a 3-month double-blind, placebo-controlled parallel trial²⁰ supplementation with a small, concentrated dose of Montmorency cherry juice (30 ml twice daily) improved sustained attention and reduced mental fatigue in middle-aged adults compared with an energy-matched control. Interestingly, Concord grape juice consumption (355ml; 777mg total polyphenols) consumed daily over 12 weeks has also been found to improve spatial memory and driving performance in women aged 40-50 years with preteen children²¹.

Finally, other research²² has examined cognitive recovery following alcohol consumption. In a study of 15 adults²², drinking Angelica keiskei/green grape/pear juice after alcohol (1.25 g/kg) significantly reduced headache and thirst scores compared with water, suggesting that the juice may reduce the impact of hangover symptoms, potentially through enhanced activity of alcohol-metabolising enzymes.

Observational studies

Reduced anxiety

The French NutriNet-Santé cohort study²³ found that FJ intake was associated with lower odds of persistent anxiety, an effect that may relate to its antioxidant properties and monosaccharide content, which appear to aid inflammation regulation and brain energy metabolism²⁴.

Similarly, an analysis of the U.S. National Health and Nutrition Examination Survey (NHANES; 1988-1994)²⁵ found that around 21% US adults (20yrs+) were FJ consumers, and these adults experienced 16% fewer days per months feeling anxious compared to those who didn't drink FJ.

Lower risk of poor cognitive function

A U.S. study²⁶ involving 27,842 men (average age 51 years) found that those who consumed orange juice daily had significantly lower odds of reporting poor cognitive function compared to those who drank it only once a month or not at all. The effect may be attributed to orange juice's high content of the carotenoid β -cryptoxanthin, which is thought to reduce oxidative stress and inflammation in the brain.

Lower risk of dementia and Parkinson's Disease

Although not specific to FJ, a French 12-year follow-up study²⁷ found that older people with a dietary pattern higher in polyphenols and flavonoids (including those from citrus) had a lower dementia risk.

A US prospective cohort study²⁸ found that oranges/orange juice were one of the top contributors of dietary flavonoids and higher intakes of flavonoids were associated with lower risk of mortality from Parkinson Disease.

Effects compared with SSB

A 2011-2014 U.S. NHANES analysis²⁹ with older adults (60 years+) found that FJ was not associated with cognitive performance whilst SSB were associated with lower memory performance. It was suggested that antioxidants and vitamins present in FJ may counteract the presence of natural sugars, such as fructose³⁰. Similarly, another US study, in 66,589 adults³¹, reported that FJ consumption was not associated with poor mental health, in contrast with daily intake of SSBs which increased the risk.

Conclusions

Further rises in brain disease and poor cognitive health are predicted as European populations age. Drinking a daily glass of FJ to complement an increased fruit and vegetable intake can help to protect the brain. The effects may be due to vitamin C, folate and polyphenols found in both fruits and their juices. Specific polyphenols, including the citrus flavanones hesperidin, naringin and narirutin, may have anti-inflammatory and antioxidant effects on brain cells and help to influence the brain-gut axis.

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References

- 1 World Health Organization (2022) Optimizing brain health across the life course: WHO position paper. Geneva, Switzerland. Available at: https://books.google.co.uk/books?hl=en&lr=&id=onoOEQAAQBAJ&oi=fnd&pg=PR11&ots=LRQolyzXYk&sig=w-maWrG7zso3At61YMcl8B8i3btM&redir_esc=y#v=onepage&q&f=false
- 2 Alzheimer Europe (2025) Prevalence of dementia in Europe. Available at: https://www.alzheimer-europe.org/dementia/prevalence-dementia-europe?language_content_entity=en
- 3 Chen Y et al. (2022) Defining brain health: A concept analysis. *Int J Geriatr Psychiatry* 37(1).

- 4 Grande G et al. (2020) Prevention of dementia in an ageing world: Evidence and biological rationale. *Ageing Res Rev* 64:101045.
- 5 Carrillo JÁ et al. (2019) Cognitive Function and Consumption of Fruit and Vegetable Polyphenols in a Young Population: Is There a Relationship? *Foods* 8(10):507.
- 6 Lu B et al. (2014) BDNF and synaptic plasticity, cognitive function, and dysfunction. *Handb Exp Pharmacol* 220:223-50.
- 7 Pontifex MG et al. (2021) Citrus Polyphenols in Brain Health and Disease: Current Perspectives. *Front Neurosci* 15:640648.
- 8 Hajialyani M et al. (2019) Hesperidin as a Neuroprotective Agent: A Review of Animal and Clinical Evidence. *Molecules* 24(3):648.
- 9 http://ec.europa.eu/food/safety/labelling_nutrition/claims/register/
- 10 Luine VN (2014) Estradiol and cognitive function: Past, present and future. *Hormones and behaviour* 66(4): 602-18.
- 11 Kiely KM (2014). Cognitive Function. In: Michalos, A.C. (eds) *Encyclopedia of Quality of Life and Well-Being Research*. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-0753-5_426
- 12 Wang Y et al. (2022) Effects of chronic consumption of specific fruit (berries, cherries and citrus) on cognitive health: a systematic review and meta-analysis of randomised controlled trials. *European Journal of Clinical Nutrition* 77: 7-22.
- 13 Lamport DJ et al. (2012) The effects of flavonoid and other polyphenol consumption on cognitive performance: A systematic research review of human experimental and epidemiological studies. *Nutrition and Ageing* 1: 5-25.
- 14 Lamport DJ et al. (2017) The effects of flavanone-rich citrus juice on cognitive function and cerebral blood flow: an acute, randomised, placebo-controlled cross-over trial in healthy, young adults. *British Journal of Nutrition* 116: 2160-2168.
- 15 Haskell-Ramsay CF et al. (2017) Cognitive and mood improvements following acute supplementation with purple grape juice in healthy young adults. *Eur J Nutr* 56(8):2621-2631.
- 16 Alharbi MH et al. (2015) Flavonoid-rich orange juice is associated with acute improvements in cognitive function in healthy middle-aged males. *Eur J Nutr* 55(6):2021-9.
- 17 Kean RJ et al. (2015) Chronic consumption of flavanone-rich orange juice is associated with cognitive benefits: an 8-wk, randomized, double-blind, placebo-controlled trial in healthy older adults. *Am J Clin Nutr* 101(3):506-14.
- 18 Choi J et al. (2023) Effects of Flavonoid-Rich Orange Juice Intervention on Major Depressive Disorder in Young Adults: A Randomized Controlled Trial. *Nutrients* 15: 145.
- 19 Park M et al. (2020) Flavonoid-Rich Orange Juice Intake and Altered Gut Microbiome in Young Adults with Depressive Symptom: A Randomized Controlled Study *Nutrients* 12, 1815.
- 20 Kimble R et al. (2022) Polyphenol-rich tart cherries (*Prunus Cerasus*, cv Montmorency) improve sustained attention, feelings of alertness and mental fatigue and influence the plasma metabolome in middle-aged adults: a randomised, placebo-controlled trial. *British Journal of Nutrition* 128: 2409-2420.
- 21 Lamport DJ et al. (2016) Concord grape juice, cognitive function, and driving performance: a 12-wk, placebo-controlled, randomized crossover trial in mothers of preteen children. *Am J Clin Nutr* 103(3):775-83.
- 22 Kim MJ et al. (2018) Effect of Mixed Fruit and Vegetable Juice on Alcohol Hangovers in Healthy Adults. *Prev Nutr Food Sci* 23(1):1-7.
- 23 Kose J et al. (2022) Associations of overall and specific carbohydrate intake with anxiety status evolution in the prospective NutriNet-Santé population-based cohort. *Scientific reports* 12: 21647.
- 24 Godos, J. et al. (2020) Diet and mental health: Review of the recent updates on molecular mechanisms. *Antioxidants* 9(4): 346.
- 25 Agarwal S et al. (2022) Association of 100% Fruit Juice Consumption with Cognitive Measures, Anxiety, and Depression in US Adults. *Nutrients* 14(22):4827.
- 26 Yuan C et al. (2019) Long-term intake of vegetables and fruits and subjective cognitive function in US men. *Neurology* 92(1): e63-e75.
- 27 Lefèvre-Arbogast S et al. (2018) Pattern of polyphenol intake and the long-term risk of dementia in older persons. *Neurology* 90(22): e1979-e1988.
- 28 Zhang X et al. (2022) Intake of Flavonoids and Flavonoid-Rich Foods and Mortality Risk Among Individuals With Parkinson Disease: A Prospective Cohort Study. *Neurology* 98(10):e1064-e1076.
- 29 Gomes Gonçalves N et al. (2014) Different Sources of Sugar Consumption and Cognitive Performance in Older Adults: Data From the National Health and Nutrition Examination Survey 2011-2014. *J Gerontol B Psychol Sci Soc Sci Apr* 1;78(4):620-628.
- 30 Lamport DJ et al. (2014) Fruits, vegetables, 100% juices, and cognitive function. *Nutrition Reviews* 72: 12: 774-789.
- 31 Freije SL et al. (2021) Association Between Consumption of Sugar-Sweetened Beverages and 100% Fruit Juice With Poor Mental Health Among US Adults in 11 US States and the District of Columbia. *Prev Chronic Dis* 18:E51.