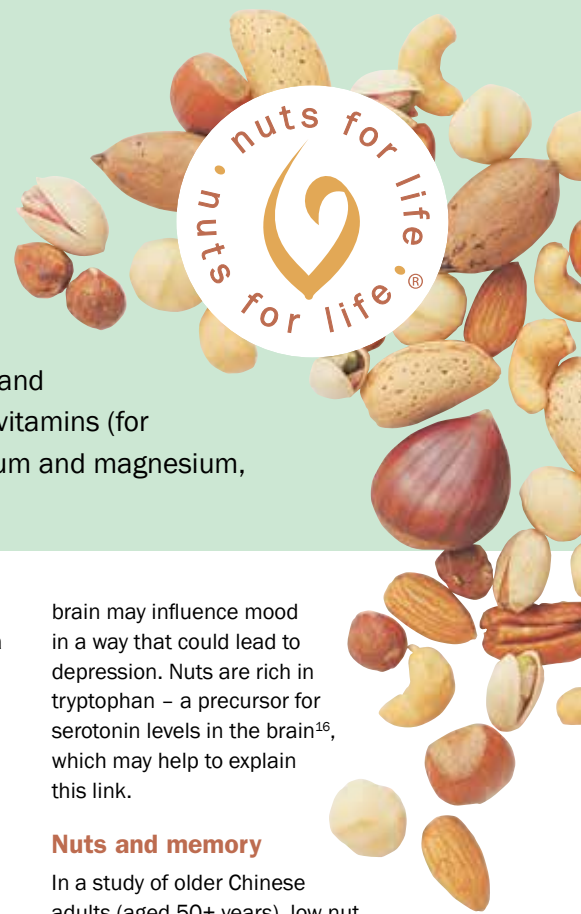


Nuts and brain health

Tree nuts, such as **almonds, Brazil nuts, cashews, chestnuts, hazelnuts, macadamias, pecans, pine nuts, pistachios** and **walnuts** are rich in a wide range of nutrients that are important for brain health and optimal cognitive performance. These include healthy fats (monounsaturated and polyunsaturated fats) and proteins plus antioxidant compounds (flavonoids and resveratrol). Nuts also contain essential vitamins including several B group vitamins (for example folate), vitamin E and minerals such as calcium, iron, zinc, potassium and magnesium, selenium, manganese and copper.



Regular nut consumption is linked to better cognitive function

Longitudinal studies have reported that regular nut consumption is associated with better cognitive function¹. Men in the Health Professionals Follow-up Study that regularly consumed nuts (>2 servings/week) had better overall cognitive function compared to those who rarely ate nuts².

Data across multiple National Health and Nutrition Examination (NHANES) surveys, representing over 10,000 individuals found that cognitive function was consistently greater in adult participants that consumed walnuts, regardless of age, gender, race, education, BMI, smoking, alcohol consumption and physical activity³.

Several prospective studies have demonstrated a positive association between nut consumption and cognitive performance, with greater benefits observed in those with higher long-term total nut intake¹, and in those with the highest consumption of nuts⁴. One study has also suggested that eating nuts on a regular basis strengthens brainwave frequencies associated with cognition, healing, learning, memory and other key brain functions⁵, with another study showing benefits when walnuts are consumed⁶.

Two randomized, controlled intervention trials have independently evaluated the efficacy of a Mediterranean diet on cognitive function^{7, 8}. The PREvención con Dieta MEDiterránea (PREDIMED) tested three dietary patterns among elderly Spanish participants at high cardiovascular risk over several years. Participants who consumed a Mediterranean diet (either containing extra virgin olive oil or mixed nuts: walnuts, almonds and hazelnuts) had improved cognitive ability (based on changes in memory, global cognition, attention and executive function) compared with participants who had consumed a low-fat diet^{7, 9}. Results from PREDIMED also highlighted a lower risk of depression and lower prevalence of developing mild cognitive impairment with the group of participants who consumed the Mediterranean diet with nuts^{7, 10}.

Nuts and mood

Several healthy foods, including nuts have been linked with a lower risk of depression^{11, 12}. Recent evidence from The SMILES intervention (Mediterranean style diet which contained 1 serve of nuts per day) found improvements in rating of depression after 12 weeks of dietary modification¹³. Other studies have shown that nut consumption can lower depression in young men and improve mood^{14, 15}.

It has been suggested that an imbalance in the levels of the hormone serotonin in the

brain may influence mood in a way that could lead to depression. Nuts are rich in tryptophan – a precursor for serotonin levels in the brain¹⁶, which may help to explain this link.

Nuts and memory

In a study of older Chinese adults (aged 50+ years), low nut consumption was associated with higher rates of mild cognitive impairment (MCI)¹⁷. A small intervention study tested whether the consumption of one Brazil nut per day compared with a nut free diet for 6 months could improve cognitive function in older adults with MCI. They found improvements in verbal fluency and reduced difficulty with a drawing task in the Brazil nut group, providing preliminary evidence that Brazil nut consumption can have positive effects on some cognitive functions of older adults with MCI¹⁸.

How key nutrients in nuts contribute to brain health

The essential nutrients in nuts all have important roles in aspects of brain health. Table 1 highlights the main mechanisms of action of polyunsaturated fatty acids, vitamins and minerals and phytonutrients. Eating a small handful of nuts each day is a great way to consume these essential nutrients. It is important to remember that nutrients may not have the same effects when consumed as supplements, compared with eating whole foods.

Mechanisms to explain brain benefits linked to eating nuts

Several factors are known to influence cognitive function including impaired metabolic regulation, oxidative stress and inflammation. Nut consumption has been linked to a wide range of benefits including reduced oxidative damage, inflammation and platelet aggregation as well as better vascular responsiveness and immune functions^{19, 20}. Regular nut consumption has great potential in preventing or slowing the progressing of age-related brain dysfunction^{19, 21}.

Table 1: Key function of nutrients on brain function

B group vitamins (folate, vitamin B2, vitamin B6 and vitamin B12)	Necessary for the production of specific components of the brain, such as neurotransmitters and cell structure
Polyunsaturated fatty acids	Critical components of neuronal cell membranes, maintaining membrane fluidity and communication between brain cells
Vitamin E	Directly involved in nervous cell membrane protection through its action as an antioxidant
Magnesium and calcium	Regulation of brain cell communication (neurotransmission)
Zinc	Component of enzymes and as a structural component of many proteins, hormones, hormone receptors and molecules involved in brain cell communication (neuropeptides)
Iron	Necessary to ensure oxygenation of the brain, as well as for the synthesis of neurotransmitters and myelin
Trace minerals such as manganese and copper	Participate in enzymatic mechanisms that protect against free radical damage
Phytonutrients (such as carotenoids and flavonoids)	Neuroprotective function through its role as an antioxidant

Nuts and brain health

Heart and blood vessel health has been closely linked with cognitive function and the ability of nuts to improve vascular function has also been suggested as one of the ways that nuts may improve cognitive function^{22, 23}.

Laboratory studies have found that walnuts can provide protection against death of specific types of brain cells important for memory, and also improve learning and memory formation^{24, 25}. It has been proposed that these actions occur through limiting chronic inflammation, reducing cell damage and neurodegeneration²⁶ and by increasing the formation of specialised receptors that are involved in cognitive functions^{25, 27-29}.

Dietary patterns for better brain function

Following a healthy dietary pattern, which limits the intake of added sugars and processed foods, while maximising intakes of fish, fruits, vegetables, nuts, and seeds is promoted as one strategy to help slow down signs of aging including cognitive decline³⁰. There is evidence to support healthy dietary patterns benefiting cognitive performance in younger populations with nuts being a key part of these diets³¹.

The Mediterranean diet is one dietary pattern that has been extensively studied to determine associations with cognitive function. Several types of nuts are commonly consumed as part of the Mediterranean diet including walnuts, hazelnuts, pistachios and almonds. Studies have reported that adherence to a Mediterranean dietary pattern (including nuts), is associated with lower risk of cognitive impairment³² and better verbal memory scores³³. In addition, prospective cohort studies have reported improved cognitive performance⁹ and a reduced incidence of cognitive decline when a Mediterranean dietary pattern (with nuts as a key component) is adhered to^{34, 35}.

Based on current available evidence, eating nuts regularly is good for your brain. So, ensure you enjoy a healthy handful, every day.

For further information on nuts and health refer to www.nutsforlife.com.au or follow us on social media [Facebook/nuts4life](#) [Twitter @NutsForLife](#) [Instagram @nuts_for_life](#)

This information has been prepared with assistance from Associate Professor Alison Coates, University of South Australia, for educational purposes only.

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