Complex Mental Activity

UNSW AUSTRALIA

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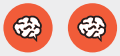
New brain cells are produced well into our 80s, especially in the parts of the brain responsible for memory and learning.

Better Brain. Better Life

Complex Mental Activity and Social Engagement

Research Rating	Research Message	Possible Strategies
	Complex mental activities reduce the rate of progression of cognitive decline and possibly lower the risk of dementia	Engage in challenging complex mental activities throughout your lifespan, including: • Formal learning (e.g. short courses through TAFE, community college, online learning or university) • Learning a new skill, language, dance • Socialising, e.g. joining a book club or other interest group • Volunteering • Brain training
	How much you actively use your brain now will influence how well your brain functions later	
	Choosing new activities and experiences, developing new skills or doing things differently improves brain health and possibly reduces dementia risk	• Learning to dance or play a new sport • Learning a new language • Learning to play new challenging games, e.g. bridge • Learning to play an instrument • Learning a new hobby or skill at a high level, e.g. sewing, carpentry, gardening • Socialising • Volunteering
	Work is a complex mental and social activity and working longer into older age is associated with lower risk of cognitive impairment and dementia	• Consider continuing to work for longer; options could include part-time work, consultancy or job-sharing • If you have already retired, consider: – Volunteering – Membership on committees that are of interest to you or that you have relevant experience in (e.g. advocacy groups, advisory groups for your career field, sporting or Rotary) – Taking up a new hobby, e.g. painting, writing a memoir
	Brain training may slow cognitive decline and improve cognitive function	• Many brain training programs are available, but there is no head to head comparison to say if one is better than the others. For more information about choosing brain training products, see the Brain Training box on page 13
	Social connection and social activity reduces dementia risk	• Expand your social network and incorporate a range of different types of social connections, e.g. friends, family, people with similar interests or hobbies • Volunteer, e.g. teaching or tutoring school children or migrant groups English at the local library, Meals on Wheels, conservation and bush-care groups • Join a local group, society or organisation, e.g. Rotary, community gardens in your areas • Plan regular social activities, e.g. book clubs, movie or theatre visits or bush walks

 Low quality evidence

 Medium quality evidence

 Good quality evidence

 Excellent quality evidence

Complex Mental Activity

Complex mental activity is critical for a healthy brain as it enhances brain function much like exercise strengthens muscles. A life-time of varied complex mental activities, such as education, travel, speaking different languages and pursuing hobbies, has been shown to significantly improve brain health and slow the rate of cognitive decline.

Importantly, research demonstrates that complex mental activities in early and mid life influence late life cognitive health, although there is evidence that being mentally active is important at all ages. Everyone's brain has the ability to significantly compensate for the physiological changes of ageing by neuroplastic reorganisation to cope with declining function. New brain cells are produced well into our 80s, especially in the parts of the brain responsible for memory and learning.

The latest research summarised in the Word Alzheimer Report on Dementia and Risk Reduction recognises that there is currently no cure for dementia. The report identified that attending to modifiable risk factors is the best method we currently have to delay the clinical onset of the disease. According to the report delaying the onset of clinical dementia by just 5 years would reduce the population prevalence by 50%. The report stated that brain health is important across the life span, particularly in mid life, and is associated with a longer, happier, and more independent life.

Alzheimer's Disease International 2014 Report

Recreational activities, making new friends and adopting new complex leisure pursuits can all be of benefit to brain health.

Research indicates that older adults do less varied and demanding activities as they age. This is concerning because optimal brain health requires continued complex mental activity. Recreational activities, making new friends and adopting new complex leisure pursuits can all be of benefit to brain health.

Engage in activities that make you think, learn something new, problem-solve, create or imagine something novel, and which are social and provide a positive emotional experience. These key aspects of complex mental activities stimulate neuroplasticity, the brain's capacity to adapt and change, and increase a sense of life satisfaction and psychological wellbeing. Simply say yes to new experiences and invitations if they appeal to you.

"While particular brain regions are crucial for specific functions, the ease of information flow within and between regions underpins most brain functions. We all know what happens when road or phone networks get clogged or interrupted. It's much the same in the brain. With age, the brain network deteriorates and this leads to slowing of the speed of information processing, which has the potential to impact on other cognitive functions."

– Professor Perminder Sachdev

Simply say yes to new experiences and invitations if they appeal to you

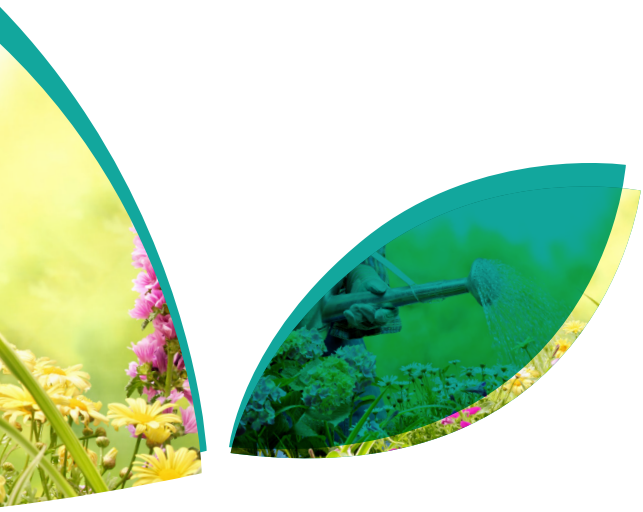
Research Findings

1. ***Complex mental activities reduce dementia risk.*** A meta-analysis of 22 studies examined the results of complex mental activity for 29 000 individuals. The results clearly indicated that the risk of dementia is nearly halved by increasing complex mental activity in mid to late life.

Studies indicate the risk of dementia is nearly halved by increasing complex mental activity in mid to late life.

2. ***Start new types of complex mental activity.*** Choosing new activities and experiences, developing new skills or doing things differently is very important. Much of new learning involves a change in the amount of activity across a synapse. Repeated use strengthens the synapse, but only for that particular skill – so don't just focus on what you are good at. Make having new experiences a life-long habit to continually stimulate and challenge your brain. Choose activities that you will enjoy so that you engage in them often and stay motivated.

Make having new experiences a life-long habit to continually stimulate and challenge your brain.



3. ***Start mental activity today.*** One recent study examining leisure activities reported that how much you actively use your brain now will influence how well your brain functions later.

How much you actively use your brain now will influence how well your brain functions later

4. ***Work is a complex mental activity.*** A range of different types of studies have identified that the type of occupation influences cognitive health, with more cognitively demanding types of work decreasing dementia risk. Similarly, working longer into older ages is associated with lower risk, whilst earlier retirement has been associated with increased dementia risk. According to Cambridge University's Cognitive Function and Ageing Study, published in 2012, people who were better educated, had worked in mentally challenging jobs and were more socially engaged had a 40% lower chance of developing dementia.

5. ***Mental activity can benefit people with dementia.*** Mental activity, or cognitive stimulation, may also help slow disease progression in those who are in the early stages of the disease. A meta-analysis of 15 randomised controlled trials found that adults with mild to moderate dementia improved in their memory and thinking following a cognitive stimulation program. Activities typically include orientation exercises, developing personal autobiographical stories, discussing current affairs, following the news and completing puzzles. However, people with early dementia will usually need some assistance to develop a program of mental stimulation, and it may not be appropriate for those with more severe cognitive difficulties in the later stages of dementia.

"Learning is not just about thinking. We learn things better when emotion is involved."

– Professor Perminder Sachdev

Brain Training

Brain training games, known as computerised cognitive training (CCT) in clinical research, often claim to improve cognitive function, delay dementia onset and slow disease progression. The evidence remains unclear with conflicting results being reported. Despite this, well designed randomised control trials in adults with normal and impaired cognitive function do indicate that CCT may result in improved cognitive performance. Importantly, no trial of CCT has reported negative effects.

Train multiple cognitive domains

Training different brain functions is associated with benefits to a range of cognitive domains including memory, executive function (i.e. higher cognitive functions such as planning, problem-solving, abstract thinking and mental flexibility), information processing and attention, as well as overall cognition. Research indicates that different cognitive domains vary in the amount of training time needed for improvement.

Research Findings

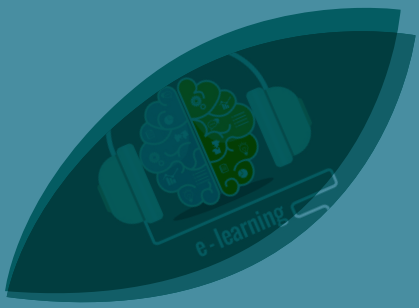
1. ***Brain training can slow cognitive decline.*** An early systematic review of CCT in healthy adults indicated that training slowed age-related cognitive decline on a range of cognitive tasks, with moderate improvement from training compared to a control group of people who did not train.

2. ***Brain training can improve cognitive function.*** The ACTIVE trial, the largest and longest research trial of CCT, found improved information processing after CCT. Importantly, it also indicated that these benefits transferred to daily function: a person engaged in CCT was better able to perform and manage everyday tasks, but these gains took years to develop.

In the ACTIVE trial, improved cognitive function from brain training transferred to benefits in performing every day activities.

3. ***Brain training changes the brain.*** Positive neuroplastic brain changes occurring as a result of CCT have impacts on a range of brain functions. These included improved activity in the hippocampus, improved electrical signalling in the brain, and positive changes to brain metabolism. However, this research is only preliminary and further studies are needed.

Note: Computerised brain training is not for everyone. Find out if it suits you. Research evidence suggests it works best when supervised in a group setting. It is important to persist, however it should remain enjoyable and not become too stressful for it to be of benefit.



Getting started	**Investigate different brain training products available, and complete the free trial if available. Questions to ask yourself so you can choose the best product for your needs are:-** • Is the product based upon scientific research? • Does the product provide a structured program? • Does the product identify what part of the brain is being trained? • Does it include different types of exercises to challenge different brain functions? • Do the exercises get harder and change to keep being challenging? • Is the product easy, fun to use, and something you want to do? • What is the cost of signing up for the program? Check that your computer has the necessary capacity to run the program, sound system, and other requirements, and make sure you can download and run the program easily. Check the instructions are clear and easily comprehendible. Check that the exercises are self-paced and repetitious, and the tasks are enjoyable.
Making gains	• It is important to stay motivated. How about setting yourself goals and rewarding yourself when you reach them? Perhaps there is a competitive aspect, so you challenge another user or compare your progress with other people you know. Share your improvements with other people and be proud. • Check out the feedback or progress reports provided by the program and keep results to chart your progress over time. However, take care not to become too worried about the feedback; the process should be enjoyable and not stressful. • Aim to complete activities that train different cognitive functions such as memory, language, attention, speed, and problem solving, as this has the best results. • Research suggests that training three times a week, for about 30-45 minutes each session is optimal, and keep training regularly for at least three months for best results.
Topping up	• Several research studies indicate that having “top-up” training sessions help to maintain training gains. You could start a “booster” brain training period or start on a new product. • Commence or continue other cognitively demanding activities such as those suggested in the Complex Mental Activity Checklist on page 17. Always remember that your brain needs to be given new things to do; so try not to keep doing what you are good at. Instead, try activities that you find difficult.

Social Engagement

The significance of social connectedness in relation to healthy brains is greatly underestimated. Being part of a social network has been shown to have multiple health and psychological benefits including improved immune function, better cardio-vascular function and reduction in mental illness, with secondary benefits of increased happiness, less stress, greater resilience, a sense of meaning and purpose, and greater life satisfaction. The benefits of improved psychological and physical health extend to ageing and the reduction of dementia risk.

> "The significance of social connectedness in relation to healthy brains is greatly underestimated."
>
> – Professor Perminder Sachdev

Social Engagement - Research Evidence

1. ***Social connection reduces dementia risk.*** A longitudinal Honolulu study of 2513 adults found those with high numbers of social connection in mid to late life had a lower risk of dementia several years later, although another similar study did not find the same result.

2. ***Social activity reduces dementia risk.*** After tracking over 1000 older adults for 12 years and controlling for a range of factors, including education, anxiety, disability, cognitive and physical activity, a one point increase in social activities was associated with a 47% lower rate of overall cognitive decline. Those who were very frequently socially active enjoyed as much as 70% reduction in risk of cognitive decline compared to those who were infrequently socially active.

3. ***Quality of relationships is important.*** Feelings of loneliness cause significant psychological distress and contribute to poor mental and physical health. Research indicates that it is feelings of loneliness, and not social isolation, that predict clinical dementia in later life. Therefore quality of relationships is important as it is possible to feel lonely within a social network, and not have feelings of loneliness in the absence of a social network. Feelings of isolation can lead to depression, which is associated with greater cognitive decline. As such, it is essential that as well as being physically and mentally active, we stay socially engaged and connected as we age.

Feelings of isolation can lead to depression, which is associated with greater cognitive decline.

Different social networks have different health benefits.

A longitudinal study of over 4000 adults classified social networks into four types: diverse, family-focused, friend, and restricted. They found that different social network types had different health benefits, suggesting that a range of social contacts is important for brain health.

Get socially connected and be socially active

Getting started	• Identify your social network by listing the names of family, friends and acquaintances. • If you can't think of anyone, consider joining a social network online, volunteer, join a group such as a book club at your local library, or meet your neighbours. • A diverse network is good; so establish the essential set of social contacts on whom you can rely for assistance, those with whom you share an interest, and those you might go out with or invite to visit. • Work out the best times for you to connect with people, either by telephone, face to face, or over the internet through social media. • Plan activities or experiences and invite members of your social network – it could be movies, meals, hobbies, exercise, games, attending theatre or museums, or Skype conversations with those at a distance.
Making gains	• Now start to think about making new social connections or meeting new people. Expand the list by thinking of people you may have known in the past and enjoyed, or people you may have met and would like to befriend. • Volunteer or join a local group, society or organisation with similar interests.
Topping up	• Make socialising a habit. Set a regular time to catch up with members of your network – perhaps set a monthly catch up such as a movie on the first Monday of each month.

Case studies

Mary, an 81 year old widow in good health, decided to learn languages to keep herself intellectually challenged. She joined classes through her local evening college and learnt Spanish. She also joined a French conversation group held at a local French café. Both of her choices also meant social connection, social activity and complex mental activity combined! If classes are not available, or do not suit you, you can always learn a language on-line, or with a language tuition CD.

Mark, a 55 year old man with a family history of dementia, wanted to challenge his brain to build brain reserve and reduce his risk. He started by becoming an avid reader of biographies and researching on the internet to learn more. He then enrolled in a community college philosophy course for ten weeks and enjoyed that so much that he went back to University and completed a degree. His next plan is to join the local Men's Shed so he can develop his carpentry skills and start some small projects, such as making his grand-daughter a doll's house.

Complex Mental Activity Checklist

Research suggests choosing new activities and experiences, developing new skills or doing things differently is very important. Much of new learning involves a change in the amount of activity across a synapse (nerve cell connections). Repeated use strengthens the synapse, but only for that particular skill. Make having new experiences a life-long habit to continually stimulate and challenge your brain. Aim to choose 1-2 new mental activities every 12 months:

- [ ] Learn a new language – enrol at your local community college, TAFE, access online language training, or buy a learn-a-language CD.
- [ ] Continue formal learning – enrol in TAFE, community courses, University of the Third Age, Probus, Rotary, etc., and study something that interests you.
- [ ] Learn to dance – try ballroom dancing, ballet for beginners, South American or Zumba, as learning new dance steps has confirmed benefits for mental activity and brain health. Contact a dance school near you.
- [ ] Learn to read music and play a musical instrument – look in your local paper for music teachers or search online.
- [ ] Learn a new artistic and craft pursuit, like painting, knitting, carpentry, drawing or embroidery.
- [ ] Start a new hobby, such as gardening, bird-watching or bush-walking.
- [ ] Volunteer. Contact your local council or church for volunteer roles, or look online at http://www.volunteeringaustralia.org/.

There are a range of volunteering opportunities which cater to most interests, whether they be social, physical, outdoors or indoors, there is something to suit everyone.

- [ ] Play bridge or other card games – check out the Australian Bridge Federation.
- [ ] Play board games like scrabble, Pictionary, Dictionary, or charades – you could even set up a games club with friends and have a monthly games night.
- [ ] Complete jigsaw puzzles, crosswords or Sudoku.
- [ ] Join activities at your local RSL or football club - play bingo, attend talks, and socialise.
- [ ] Join an interest group or political group that suits your beliefs and get involved in their projects and attend information sessions.
- [ ] Start a book club or join one that already exists. Contact your local library or bookstore for existing book clubs and reading groups.
- [ ] Visit museums or art galleries. Most offer senior citizen or pensioner discounts on memberships or one-off visits.
- [ ] Travel. Plan a local or overseas holiday and conduct research so you can learn more about the places you are visiting. Some tour groups offer educational tours and experiences – such as art or cooking tours in Europe. You can even try exploring new areas of your city. Explore and be curious.

Glossary of Research Terms

Brain metabolism: The set of life-sustaining chemical activities in the brain cells. The brain is the most metabolically active organ in the body and uses glucose as its primary source of energy.

Brain reserve: This concept refers to a capacity of the brain to be able to function well even in the presence of varying levels of pathology. Education, complex occupation and cognitive activity increase brain reserve and make the brain more resilient to developing dementia.

Clinical trial: A clinical trial is a study examining the benefits and risks of a specific intervention or treatment in a specified group of people, like a drug trial.

Cognitive decline: Refers to reduced ability in cognitive functions such as memory, language ability, etc. When this is severe and affects the ability to function independently, it is referred to as **dementia**.

Cognitive function (or cognition): The set of mental abilities and processes related to thinking and knowledge. The various abilities (or domains) commonly referred to are attention, memory, language, spatial ability, executive ability (problem solving, decision making, task switching) and regulating social behaviour. A sum of these abilities is usually referred to as **global cognitive ability.**

Control (as in trials): In a trial, a group receiving the active 'study' treatment is compared to a 'control' group that receives the same instructions but gets either a placebo (sugar pill or similar) or another established treatment as a control for comparison purposes.

Electrical signalling: All nerve cells are electrically excitable and communicate with each other through electrical and chemical signals.

Hippocampus: Literally 'seahorse' for the shape it resembles. It is a small brain region in the temporal lobe which is critical for the consolidation of information to produce memories.

Information processing: How the brain changes and transmits information between brain regions and in relation to the outside world.

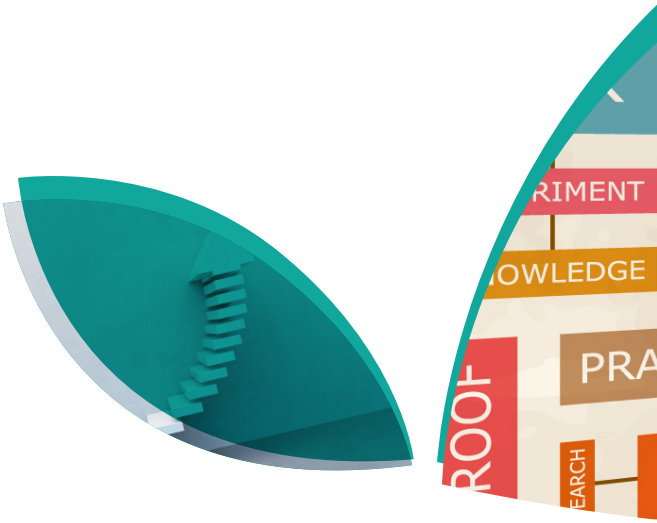
Longitudinal study: A longitudinal study is a correlational study involving repeated observations of the same variables of interest over long periods of time, often decades, in order to examine how time influences the course of disease, behaviour or intervention.

Meta-analysis: A meta-analysis is a type of systematic review which involves using special statistical techniques to synthesise the data from several studies into a single quantitative estimate of the effect of a treatment or a risk factor.

Neuroplasticity: Neuroplasticity, or brain plasticity, refers to the brain's capacity to adapt and change its structure and function in response to new experiences, such as making new connections, integrating new neurons, or changing brain metabolism.

Randomised control trial (RCT): An RCT is a clinical trial in which participants are randomly divided into two groups, those that receive the treatment under investigation and those that receive a control treatment, either a placebo or a previously tested treatment.

Systematic review: A systematic review is a comprehensive and explicit evaluation and synthesis of all available research on a specified topic in order to critically evaluate the field.



Further Reading

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www.cheba.unsw.edu.au

The Dementia Momentum

Spokesman: Richard Grellman AM

The Dementia Momentum is an important social initiative to bring the right researchers and community donors together to materially increase the pace of clear, clever and relevant work in confronting dementia.

My wife Suellen has advanced young-onset Alzheimer's disease having been formally diagnosed in 2011. She has been in Residential Care since early 2014 and is very much in need of high levels of care and support. For me, our, children, her family and close friends, have all had to learn to walk this journey with Suellen, all sharing the desolate sense of helplessness, frustration and sadness that comes with knowing that there is currently no known cure. Suellen has just turned 64.

Any advances in understanding the causes, preventative measures, treatment and care can start the process of confronting this terrible disease and hopefully reduce the number of families that have to endure what Suellen and we are experiencing.

Treating Alzheimer's and other forms of dementia is the biggest healthcare challenge for our society and The Dementia Momentum is worthy of our support. I commend this initiative to you and encourage you to do what you can to assist.

Richard Grellman AM - Chairman, Genworth Mortgage Insurance Ltd, IPH Ltd & AMP Foundation

To find out more or to make your contribution to The Dementia Momentum go to: www.thedementiamomentum.org

the dementia momentum

Better Brain. Better Life Notes

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