



Centre for Healthy Brain Ageing (CHeBA) Older Australian Twins Study

NEWSLETTER | December 2020

Season's greetings from the Older Australian Twins Study (OATS)! We hope this newsletter finds you well. Rather than relief from last year's bush fires and drought, 2020 brought us additional challenges associated with the COVID-19 pandemic. We would like to take this opportunity to reflect on the past year and share updates about OATS and highlight some of our recent research findings with you, our participants, and your relatives and friends.

OATS began in 2007 when the team received its first grant. While the funding is important, we could not have conducted the study without our participants. Over 350 twin pairs along with their friends and family ("Informants") have assisted us with our research. Early this year we circulated a survey on your experience of participating in OATS. We summarise some of your responses on page 2 of this newsletter.

As well as many tribulations, 2020 was also the year where the OATS Online Platform was finally launched. This represents a significant change in how our participants interact with the study and our team. You can read more about the milestone achievements with OATS Online on pages 2-3. We thank you for your patience with the inevitable teething problems we have encountered and for your willingness to remain involved with our study as it evolves. As you now mainly interact with OATS staff via email or phone, we have included staff profiles on pages 6-8 for your interest. Sadly, after 7 years with the team we are farewelling Suzy Forrester at the end of 2021. You can read Suzy's message to you all on page 8.

Thanks to your generous participation in our research, the data from OATS continues to support many higher degree students. On pages 4 we feature Dr Matthew Wong and his recent published research findings from OATS data.

The OATS data is also included in work by several international consortia, who require large numbers of participants to address their research questions.

OATS team members, Dr Karen Mather and Dr Nicola Armstrong, led the publication of a large consortia study,

including OATS genetics and imaging data, in the highly reputable journal,

Stroke. You can read more about this work on page 4. A complete list of our published research can be found on our website: <https://cheba.unsw.edu.au/project/older-australian-twins-study>

We hope you enjoy using the enclosed bookmark. For inspiration, see our Team's recommendations on their best books of 2020 on page 5.

On behalf of everyone here at OATS, I would like to sincerely thank you for the contribution you have made to our study thus far. I would like to convey our best wishes to you, and your families and friends, for a safe, peaceful and joyful festive season.



**Scientia Professor
Perminder Sachdev AM,
CHeBA Co-Director**

**Scientia Professor
Perminder Sachdev AM**

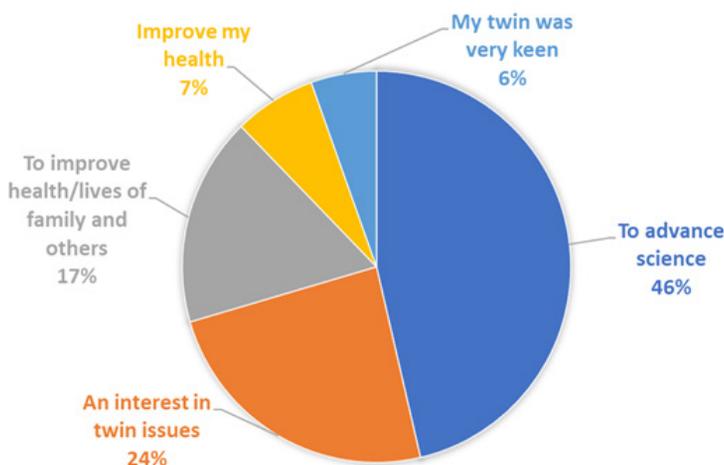
Survey: Your Experience

Early in 2020 we circulated a survey to all participants, seeking feedback on your experience participating in OATS to date. Over 200 participants responded with feedback. Given the amount of time and effort we ask of our participants, we asked what motivates you to participate in OATS. Most of you said you initially agreed to participate in OATS to help advance science, because you were interested in twin issues, or to improve the health and lives of family and others.

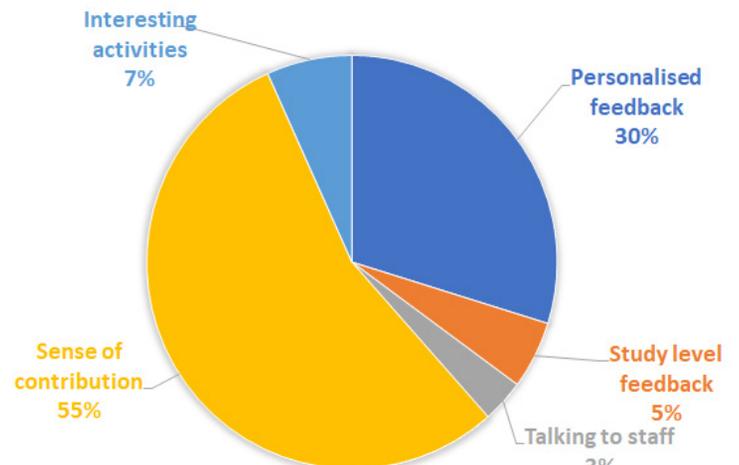
More than half of you continue to participate in OATS because it gives you a sense of contribution. Another 30% of you continue because you enjoy the personalised feedback you receive as part of your participation in OATS.

In addition to rating our suggested answers to of study participation benefits, we also asked about your best experience participating in OATS, in your own words.

Many participants reported they enjoy the interaction with staff, and we can assure you that the feeling is mutual. Quite a few participants have been alerted to potentially important medical concerns as part of their participation, such as severe memory problems and identification of brain tumours and other abnormalities from the MRI brain scans. The most frequent negative experience reported was difficulties with travelling to appointments, either due to distance, finding inner city parking or navigating large university or hospital campuses. Participating in OATS Online overcomes these difficulties as there is no requirement to travel to participate. Anecdotally, navigating the online environment presents its own frustrations for some participants and we are doing our best to improve the site and make it as easy as possible for you to complete the questionnaires and tasks.



What was your primary motivation to participate in OATS initially?



What is your primary motivation to continue your participation in OATS?

OATS Online

Since OATS commenced in 2007, the study has engaged with and assessed over 350 twin pairs aged 65 years or older, as well as interviewed the participants' nominated friends or family members (Informants) on up to four occasions. Our previous assessments involved a face-to-face interview and cognitive assessment with a research assistant and the completion of multiple questionnaires. The average participant at baseline was 70 years of age, increasing to 73 and 76 years at Wave 2 and 3, respectively. Today, the average age of OATS participants is 81 years.

In 2020 OATS began inviting our existing participants to contribute to the next stage of our study, OATS Online. In contrast to previous OATS assessments, we are using an online survey and

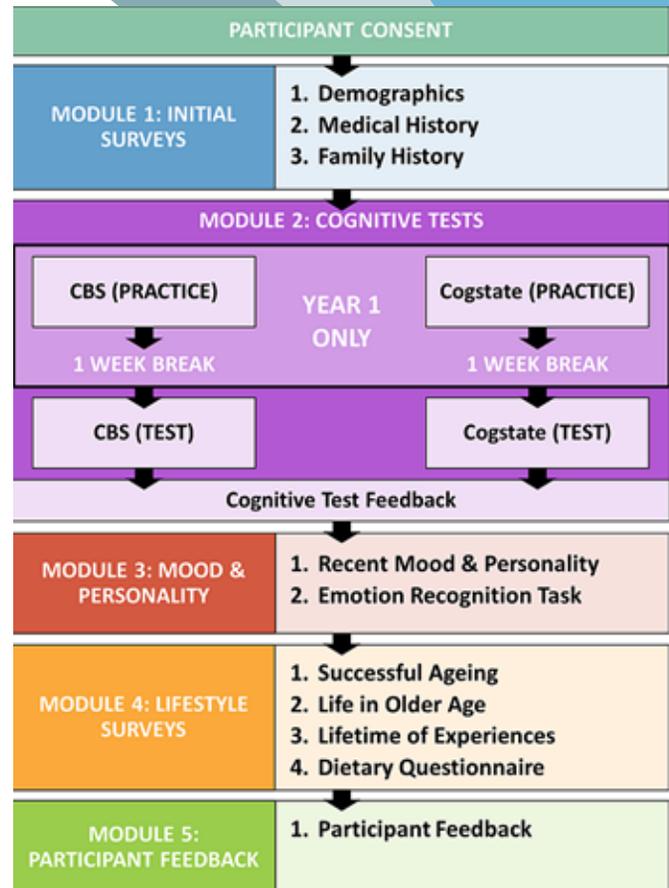
computerised assessment of cognition. We are very grateful to those of you who said YES to our invitation, including those participants for whom using a computer is too challenging and who have opted to complete some or all of the questionnaires by pen and paper. We thank you all for your forbearance as we have ironed out a few kinks in the assessment – it turns out what we think is very logical is not always so! Rest assured we read all your feedback and do our very best to make participating as straight forward as possible.

For most of our participants, this will be the fourth time you assist the Study. Follow-up assessments are critical for measuring changes with age, and with your continued involvement in this study we aim to identify risk factors for decline that may be

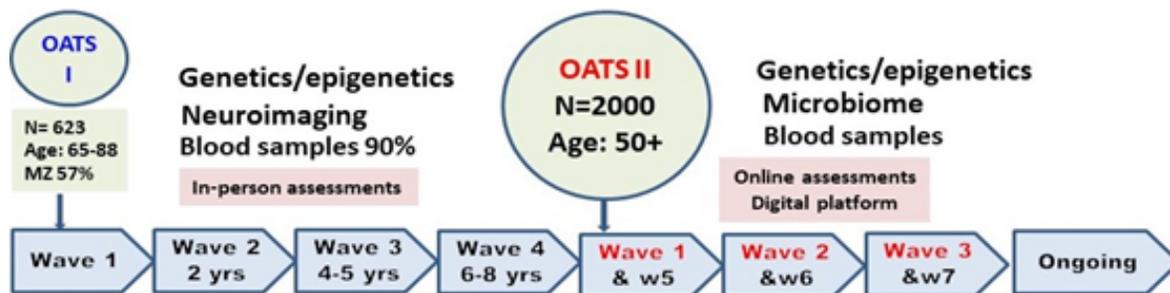
preventable. With several assessments over time we can now explore what impact life events that occurred perhaps a decade ago have on your current health and well-being. Thank you for staying with us! Many have asked if they can still participate, even if their twin is unwilling or too unwell to participate or deceased? The answer to this is yes, definitely – we still appreciate your participation and your data is still valuable. If you have not received an invitation yet, we will be in touch early in 2021.

We now know receiving personalised feedback is a key reason for continuing participation in OATS. However, we are currently not doing several measures that formed an important part of your personalised feedback, such as blood measures, medical exams and MRI scans. Rest assured, we are working to reconfigure the personalised feedback and will provide it to you all as soon as we can.

Last month the OATS Team submitted a large grant application to the National Health and Medical Research Council for future funding for our study. We hope that our success with OATS thus far will be recognised by the grant reviewers and they will reward us with ongoing funding. We will not know the outcome until the middle of 2021, but meanwhile we are keeping our fingers crossed. With new funding we hope to expand the study to include new, and younger twin participants and to collect blood measures again. Having an online assessment platform will allow us to optimise our resources and extend our invitation beyond metropolitan regions.



Your participant journey on the OATS Online Platform



OATS I started in 2007 with 623 participants aged 65+ years. With additional funding we hope to add another 2000 participants aged 50+ years to the study as part of OATS II.

1 in 10 Appeal



Let's reduce the risk

www.bit.ly/CHeBA1in10Appeal

Research findings in 2020

With the realisation 70 years ago that the sequence of four DNA building blocks forms the genetic code and specifies the order of amino acids that make up proteins, the dogma that DNA sequence equals protein structure and function was born. However, it takes more than proteins to make a functioning cell. Lipids are crucial in forming cell membranes and in enabling signalling between cells. The most commonly known lipid is probably cholesterol, but there are 100s, if not 1000s of different lipid variants. Their presence is determined by dietary intake of lipid building blocks (fatty acids) and the expression of genes coding for proteins involved in lipid synthesis, transport and degradation. In this way, both environment and genetics play a role in lipid metabolism, which in turn has important roles in metabolic disorders, cardiovascular disease, and brain disorders, such as dementia.

Dr Matthew Wong, who completed his PhD at the Centre for Healthy Brain Ageing (CHeBA) under the supervision of Dr Poljak and Professor Sachdev, evaluated the relative contributions of genetic versus environmental factors to lipid levels in blood from OATS participant. Dr Wong found that cholesterol is highly heritable. So are many triglycerides, which are the lipids we generate for energy storage and which can have a negative impact on our vascular health. However only about 13% of the lipids in this study had significant heritability, indicating that environmental and possibly epigenetic factors likely have a considerable influence on lipid profiles in healthy older age groups. Little or no heritability for most phospholipids was found, these are the lipids that form our cell membranes. Dr Wong also found that levels of the heritable triglycerides were highly



correlated with levels of gene expression and in some instances to methylation of specific genes. In general, methylation of genes has a similar effect to a volume control: the greater the amount of methylation the lower the expression of that particular gene. Interestingly, many of the genes linked to lipid levels in this study are important for immune function, and some have also been linked to amyloid production, which is relevant because an increased level of amyloid is a marker of emerging Alzheimer's Disease.

This study follows a previous study by Dr Wong which found differences in the lipid profile between men and women and identified a unique lipid profile in people who live to 95 years of age and older.

Wong et al. eLife 2020;9:e58954.

Wong et al. 2019 PLOS ONE 14:e0214141.

Did you know that of all human organs, the brain has the highest concentration and the biggest range of different lipid types?

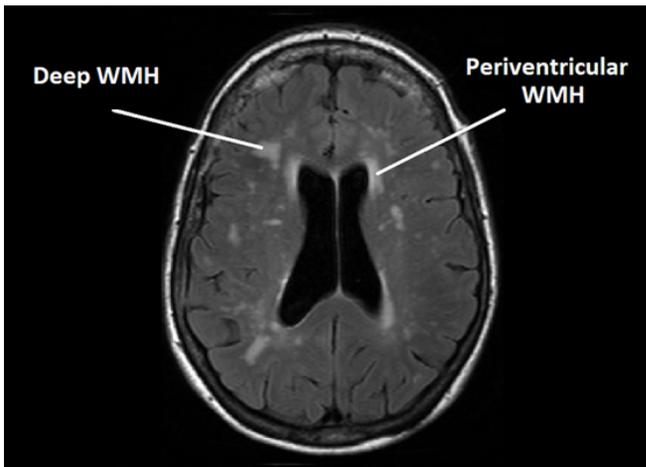


A year ago, Matthew Wong (third from right), together with CHeBA colleagues, hosted a visit by high school students interested in pursuing a career in science. The students were given an insight into the opportunities to contribute to medical research and what a career in science can look like

OATS – a piece of a larger puzzle

Dr Karen Mather, Leader of CHeBA's Genetics & Epigenomics Group and Dr Nicola Armstrong, CHeBA collaborator from Murdoch University, WA, led the publication of a world-first genetics study published in 2020 in the journal *Stroke*. The team of 96 authors, including 10 from OATS, represents 16 individual studies from across 11 different countries.

The study brought together measures of blood pressure (to indicate hypertension), genetic data and MRI scans from 26,654 research participants, including OATS participants, to identify genetic variations for neuroimaging markers that indicate high risk of stroke in an individual. The neuroimaging markers are called periventricular and deep white matter hyperintensities because of how they look (intense white marks) and where they are observed (in the white matter or surrounding the fluid filled ventricular space) in MRI brain scans. White matter hyperintensities start to appear in approximately 50% of all adults in their late 40s and progress with age. A high burden of white matter hyperintensities are thought to be related to disease of small blood vessels and are associated with increased risk of stroke.



Deep and periventricular white matter hyperintensities



The study is comprised of 16 individual studies, from 11 different countries

The study demonstrates that some genetic variants contribute to greater burden of hyperintensities in either location, but that other genetic variants are specific to the periventricular hyperintensities only. This suggests that the location of white matter intensities have slightly different genetic contributions and may have different implications for brain health, both in terms of preventative or treatment strategies and in terms of risk profiles. Closer investigation of the genetic variants suggests that periventricular white matter hyperintensities are most closely associated with ischemic stroke (where blood flow is blocked), whereas genetic variants contributing to deep white matter are important not only for vascular function, but also for function of brain cells, such as neurons and astrocytes, the latter a neuronal support cell crucial for repair and healing of brain tissue.

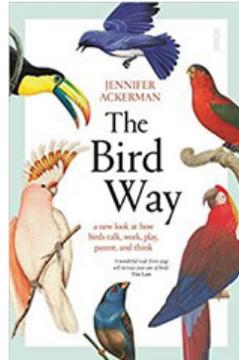
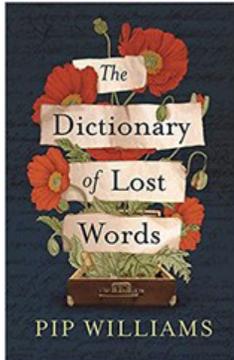
As well as providing the above important research findings, this study illustrates how many smaller pieces of a puzzle can come together to increase our understanding of brain function and risk of life changing events, like strokes. While the contribution of one research participant, one researcher, or one study, may appear small, it demonstrates the power of many.



Dr Karen Mather, Leader of CHeBA's Genetics & Epigenomics Group (right), with Dr Nicola Armstrong, CHeBA collaborator from Murdoch University

Positive Ageing

With this newsletter, you have received a Positive Ageing magnetic bookmark. We hope you or someone you know will enjoy using it. During 2020, there has been plenty of time to read for leisure as we were all spending more time at home. These are two of the many books our staff have enjoyed reading this year.



Vibeke Catts read *The Dictionary of Lost Words* by Pip Williams. The story is set in England at the time of World War I and at the height of women's suffrage movement. The story illustrates how

important written documentation is to ensure words survive changes in society and the power writers have in shaping the historic narrative. Vibeke likens this to the importance of publishing research findings, because it is the publication that informs researchers globally and allows them to advance their own research, bringing together the pieces in the puzzle required to identify causes, treatment and cures for medical conditions.

Amanda Selwood recommends *The Bird Way* by Jennifer Ackerman. While non-fiction, she found it highly engaging. The author uses the latest findings of unusual or extreme bird behaviour to turn our understanding of birds on its head. As someone working in research, Amanda was amazed by the extraordinary lengths that bird researchers go to, to observe bird behaviour in the wild. It made her doubly appreciate all the time and effort our research participants volunteer to put into the study!

Healthy
Brains.
Positive
Ageing.

www.cheba.unsw.edu.au



Meet Our Researchers

Working from home in 2020 has prevented our team meeting research participants and interested community members face-to-face. To stay in touch, we launched Meet our Researchers at part of our blog, The Brain Dialogues, which you can access at <https://cheba.unsw.edu.au/blog>.

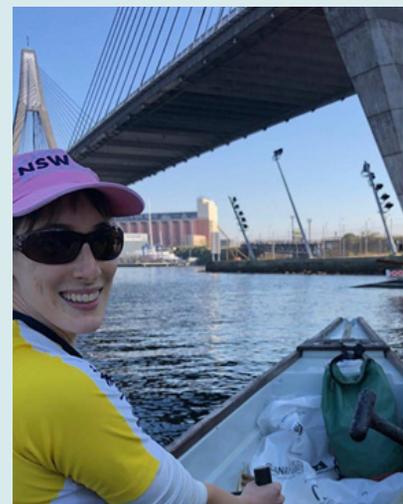
Dr Amanda Selwood

How did you get into researching the ageing brain?

I completed my PhD in Cognitive Science at Macquarie University. I was looking at twin and sibling relationships and how this affects their shared memories. I later worked as an experimental psychologist at UNSW Sydney in the Faculty of Art and Design with a team of artists. We looked at whether photography could improve older adults' memory of events. I enjoyed interacting with the older adult participants. However, I only really got into researching the ageing brain recently when I started working with OATS.

Did you experience a 'defining moment' which led you to this field?

I am an identical twin myself, so you could say that was a defining moment that led me to twin research. However, it was when I first worked with older adults during my time at UNSW Art and Design that I became particularly interested in the ageing brain. You could get two 82-year olds and they would be completely different in terms of both their physical health and cognition. I became



For Dr Selwood dragon boat racing offers both physical activity and social interaction

fascinated by why some people seem to age well and other people seem to decline much earlier in life, and this led me to seek work in this field.

Do you have any personal interests or activities which are protective behaviours against cognitive decline?

I try to keep healthy and fit. I have been doing

dragon boat racing competitively for over seven years now. I find it doesn't just improve my physical fitness but also keeps me socially engaged, with both of these factors considered protective for cognitive health. It is great being part of a community where we are all motivated to eat healthily and maintain a strong level of fitness.

What are you currently researching?

I started working with OATS in March this year, so I am relatively new to the study. I enjoy interacting with the participants, onboarding them to the project and working through the process with them over the phone and online. The study measures many behavioural and environmental factors to better understand healthy ageing, in particular lifetime physical and mental activity, physical and psychological trauma, early-life socio-economic environment and nutrition, among others.

What do you love about working for the Centre for Healthy Brain Ageing (CHeBA)?

I only had one day in the office when I started back in March and have been working from home since. Even so, I feel very much part of the team. Everyone has been welcoming, and I have enjoyed engaging with CHeBA's social media campaigns. It highlights how supportive and collegial CHeBA is.

What is the ultimate hope you have for your research?

My ultimate hope is to help people age as well as possible. It is not just about prolonging people's lives. It is about giving people strategies and resources to achieve a better quality of life. My goal is to discover how we can make our own lives better as we age, as well as the lives of the people we love.

Dr Vibeke Catts

Did you experience a 'defining moment' which led you to research the ageing brain?

I have observed first-hand the impact of brain disorders on friends and family, and the effects on their family lives. Disorders of the brain are some of the most challenging disabilities and health issues to overcome. The process of assisting a loved one with a brain disorder is challenging and achieving total recovery and effective management of such conditions is quite difficult. It is not like you can give a pacemaker, an artificial limb or another device to the affected person to help the management or recovery process.

Do you have any personal interests or activities which are protective behaviours against cognitive decline?

Fitness, keeping my weight in check, and making healthy food choices are all important to me. I enjoy reading, cycling and trail running in national parks. Trail running is a lot of fun; I find you are required to have a significant level of focus and watch where you are going - unlike pounding the pavement which becomes too monotonous for me.

What are you currently researching?

I coordinate OATS, analysing and reporting the data we are collecting. What is interesting and particularly useful about twin research is that you have identical twins sharing all their identical genetic coding and non-identical twins who share 50% of their genetic coding like other siblings. By quantifying how often an outcome (like dementia) occurs in both twins in identical versus non-identical twin pairs, we can estimate the contribution of genes to this outcome as well as estimate the contribution of environment and lifestyle to an



Dr Catts stays fit by cycling and trail running

outcome. We can also look at differences between the genders and for example explore the effect of societal and parental attitudes to boy's and girl's education on their future social and health outcomes.

Why is your research important?

Twin research gives us clues for important public health interventions and strategies to prevent disability into older age. With a larger sample of twin pairs we may be able to pinpoint a particular genetic change that ultimately leads to increased health problems in older age. Identifying such genetic changes can help identify the biological pathways for illnesses such as heart disease or dementia. For this, we need a bigger sample than what OATS currently provides, which is why we collaborate with people internationally and pool our data together as well.

What is the ultimate hope you have for your research?

To identify strategies that will ultimately result

in people having a better quality of life and that are readily accessible to a broad section of the population. We know we cannot live forever, but I

strongly believe that good health throughout life, and the lifestyle behaviours that go with that, are key to a high quality of life.

Farewell from Suzy Forrester

I first joined in OATS in March 2013 as the NSW Administrative Assistant. As anticipated, my time with OATS has been a wonderful learning opportunity, both in terms of the nitty-gritty of research generally and the importance of investing in long-term good health earlier in life.

I personally find it easiest to be proactive about healthy ageing by working to maintain my cognitive reserve through life-long learning. Having finished my Bachelor of Psychological Science (Distinction) part-time while working with OATS, I am currently enjoying reading more philosophy, history of science and literature, and learning French. We are also an enthusiastic boardgame family (especially word games) and, after an over-sedentary 2020, I'm committed to extra focus on the vital brain-maintaining area of physical activity in 2021!

In addition to my lovely colleagues, I've always



said my favourite thing about working with OATS is our participants. The commitment and generosity of spirit that they (and many of their informants!) show to making a positive difference in the world through OATS continues to be inspiring.

It is heartening to see the number of publications using OATS data increasing

over time, as all the hard work our team and participants have devoted over the years comes to fruition. Having been through many exciting changes over the last eight years, I'll miss being as closely involved with the OATS, but I'll definitely be keeping up with the new findings coming out of OATS and CHeBA!

Would you like to contribute more to OATS?

We are looking for volunteers to be participant advisors for the OATS team. This primarily involves participating in our Annual Collaborator Meeting and contributing by telling us how you think we can ensure everyone has a good experience participating in OATS. We are also interested in what you think are important questions for the study to address. Ideally, we would have two advisors. They could be you and your twin or your "informant", or they could be two unrelated volunteers. Please contact us if you would like to be involved or just like to know more.

Stay in Touch

While we have mostly been working from home during the COVID-19 pandemic, you can still reach us using the study contact details below.

Write to us at:

Older Australian Twins Study

Centre for Healthy Brain Ageing (CHeBA)

UNSW Medicine, School of Psychiatry

Level 1, AGSM (G27)

UNSW SYDNEY NSW 2052

Our toll-free number is 1800 818 946 and you can email us at twins@unsw.edu.au

DID YOU CHANGE YOUR CONTACT DETAILS?
Phone or email us and let us know.

WOULD YOU LIKE MORE NEWS?
In addition to the annual OATS Newsletter, you can opt-in to receive the CHeBA Chronicle, distributed monthly via email. Just phone or email us and let us know.



@CHeBACentreforHealthyBrainAgeing



@CHeBA_UNSW



www.bit.ly/CHeBAChannel