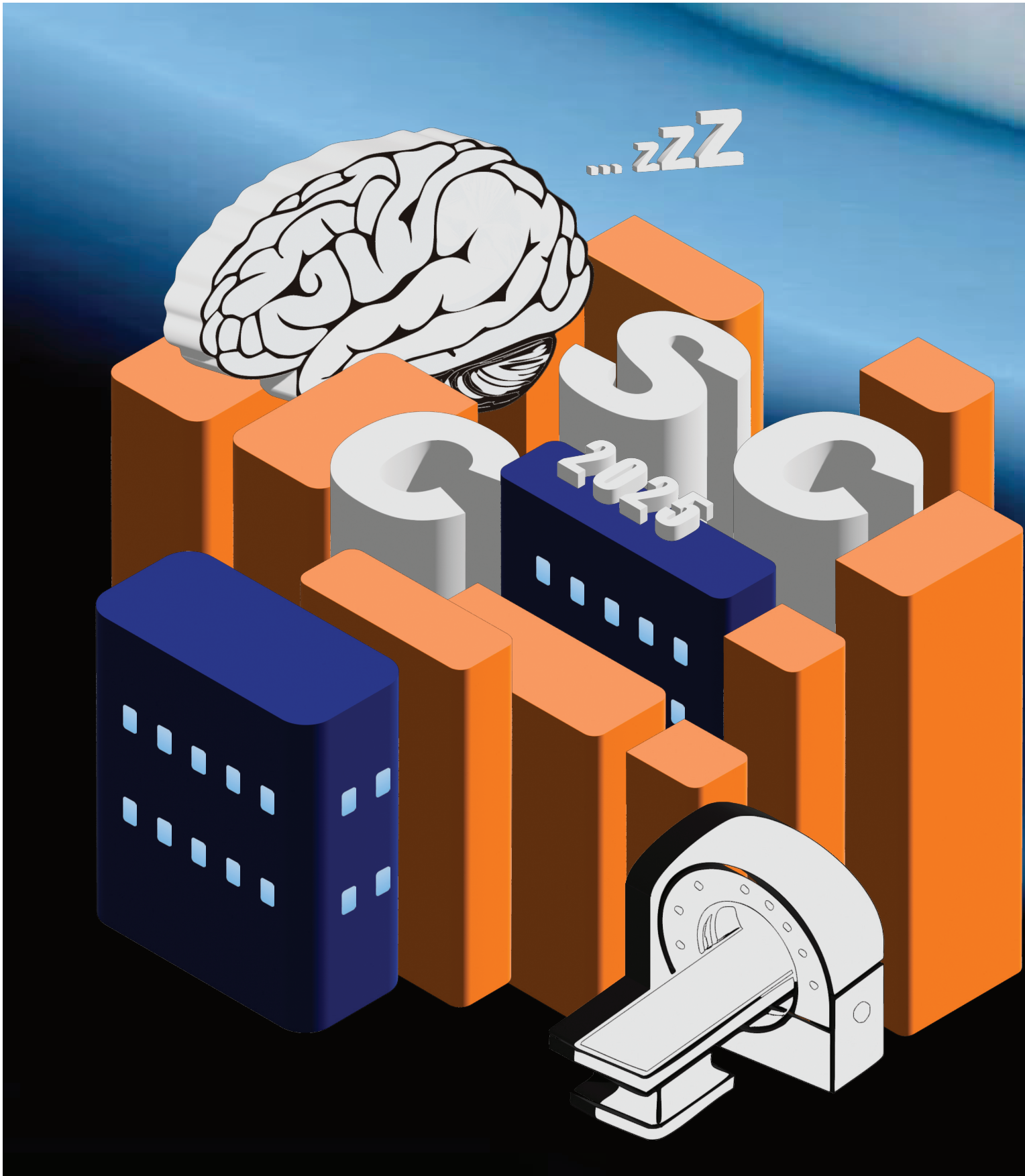
NUS National University of Singapore | Yong Loo Lin School of Medicine

ANNUAL REPORT

CENTRE for SLEEP & COGNITION

Centre for Sleep & Cognition



DIRECTOR'S MESSAGE

Prof. Michael Chee

Director, Centre for Sleep and Cognition

The Centre's Amazing Race continued through a sixth year and just when you thought we would top out, we continued to power on. That this took place on the back of an extremely challenging and volatile global geopolitical landscape is especially notable.

The constituent labs forming the Centre all reached new heights and on multiple fronts. Thomas Yeo was awarded a highly prized National Research Foundation Fellowship. The competition for this award is at a rarified level. Our contributions to peer-reviewed scientific output were headlined by Thomas Yeo's lab Nature paper on optimizing brain scanning parameters, and the World Sleep Society recommendations on the use of consumer health trackers that I helmed. Helen Zhou's lab created BrainHarmomix a revolutionary Foundation Model for functional and structural brain imaging. Jia Hou Poh made a notable contribution through an Annual Review of Psychology article on motivation for adaptive learning. The three senior lab leaders who have been the World's Top 2% cited scientists for years were joined this year by June Lo. Thomas remains a Clarivate highly cited research which puts him in the top 0.01% of practicing scientists in the world.

Our contributions to global scientific leadership were headlined by Helen's election as a Fellow of the Organization of Human Brain Mapping, joining Thomas and myself. Together, we are the only Centre in the world who can claim three Fellows among its ranks. My election to the Governing Council of the World Sleep Society opens the door to transforming the taxonomy of how sleep is measured as well as standardization of the way wearable sleep trackers report Fundamental Sleep Measures.

Following on the footsteps of the PI's, our Research Fellows have given talks and courses in the largest scientific meetings in our respective niches. We are one of a few NUS Research Centers with deep wells of expertise built from creating an ecosystem where talent is nurtured and retained for upwards of a decade. While other groups are dependent on fluctuating levels of support from cores outside their jurisdiction, our Centre has mastered all facets of the critical methodologies and instrumentation necessary to sustain success. All this has a positive effect on our graduate students and trainees who continue to be remarkably well placed in their post-CSC careers.

While discovery science remains our passion, we have come to embrace the reality that high-quality science costs money to support and that one cannot wholly depend on the capricious beneficence of funding agencies. Arising from this each of the three 'big labs' have been developing pathways to garner funding through commercial avenues. This provides pathways for talented and entrepreneurial research staff unable or unwilling to navigate the traditional 'tenure-track' route, to continue being engaged with cutting edge innovation.

Thomas' lab, in conjunction with clinical partner Dr. Phern Chern Tor has started a company to deliver MRI-targeted transcranial magnetic stimulation for treating severe depression. The setting up of the Oura-NUS Joint lab with co-funding from the EDB marks a landmark development in academic-commercial partnership well aligned to our mission to provide meaningful health biometric surveillance and interdiction where necessary for effective maintenance and optimization of health and wellbeing.

Our outreach efforts have reached a level where we needed a new section in this annual report to showcase, and what better way to do this then when major conferences like ISMRM (2024) and World Sleep (2025) come to our shores.

The Centre, supported by the Office of the President embarked on an NUS-wide awareness raising campaign to plant the message that properly conceived work-life balance is a vital ingredient for a healthier and more sustainable workplace culture.

We have done amazingly well in the last 6 years and we hope to continue along this path. High skill jobs, technological advancement, national prestige and societal relevance. We have hit all our marks. We are the Centre for Sleep and Cognition, and we are out to make an impact in all we do.

EDITORIAL TEAM

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Centre for Sleep & Cognition
https://medicine.nus.edu.sg/csc/

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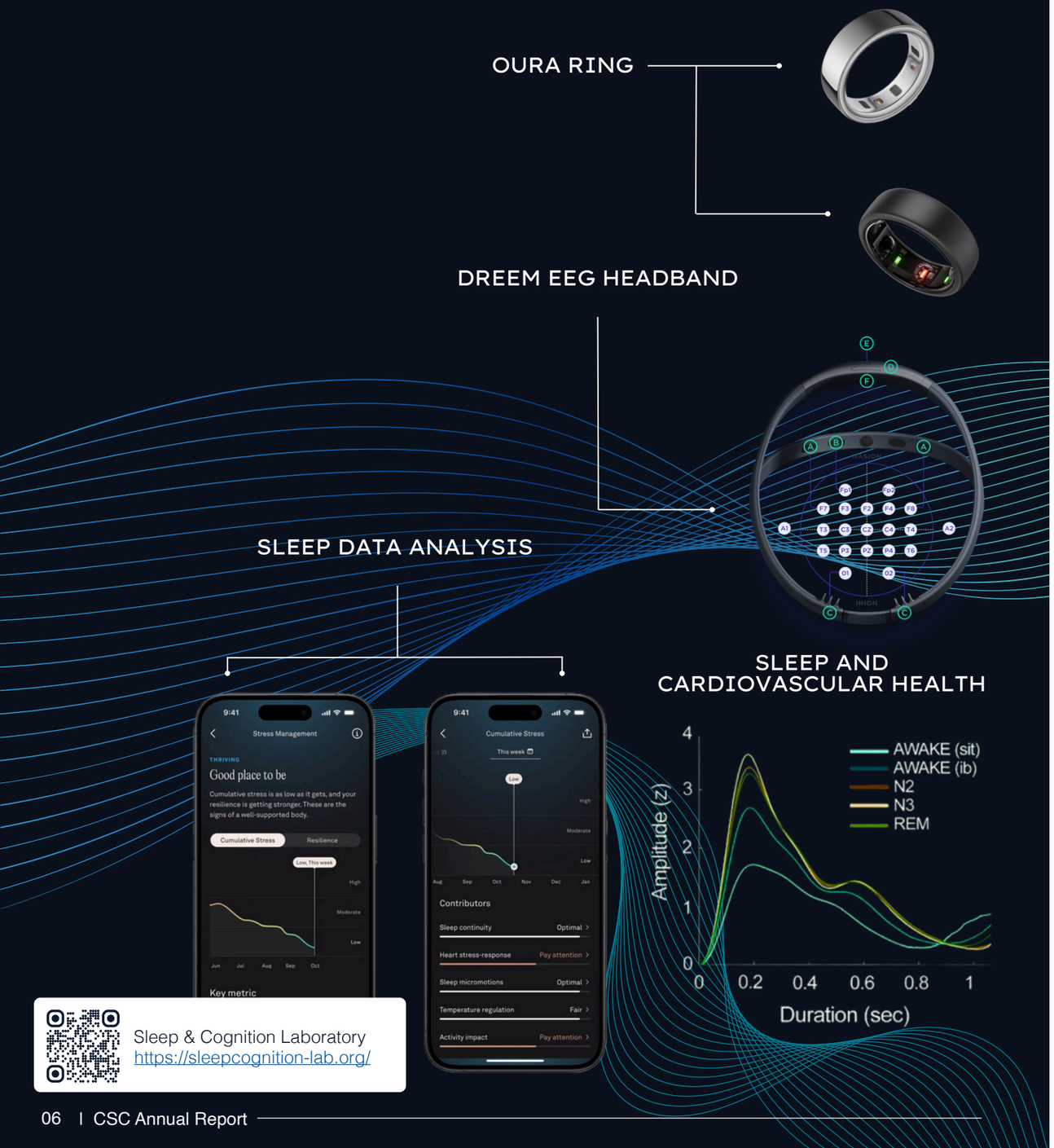


Sleep & Cognition Laboratory
https://sleepcognition-lab.org/

SLEEP & COGNITION LABORATORY

Prof. Michael Chee
SCL Principal Investigator

2025 was a year to remember for our lab, one in which our position within the global sleep community was strengthened in terms of academic achievement, societal impact as well as commercial partnership.

Advancing new knowledge that can be applied to real world situations drives us each day. We also seek to build trust in our findings by scaling up participant numbers while maintaining the rigor one expects from in-lab studies. This strategy is reflected in published work on travel related sleep disruption involving 1.5 million nights of data, and a multivariate approach to uncover associations between multidimensional sleep characteristics and multiple facets of cognition.

Other examples of translational efforts include work in review about how class assignment submission times affect sleep and affect, as well as a demonstration of how sleep tracker PPG signals can be used to ascertain 'vascular age'.

Our translational research received a major boost by the setting up of a Joint Lab with Oura Health Oy, starting October 1st 2025. This momentous milestone takes our close partnership with Oura over the last six years to a new level through injection of funds from the EDB and Oura to support scientific staff in the lab. The joint lab furthers common interests and affords extraordinary mutual benefits that you can learn more about in a special feature in this report.

I was honored to lead the 'World Sleep Society recommendations for the use of wearable consumer health trackers that monitor sleep'. This document provides pragmatic advice to users and researchers about how to best use these devices in different settings. It also speaks to manufacturers about what is needed to improve current products. The opportunity to contribute on a global scale received another boost from being elected to serve on the Governing Council of the World Sleep Society and also having myself and Ruth Leong serve on the Global Adolescent Sleep panel.

Singapore successfully hosted World Sleep 2025, where our team made outsized contributions. Dr. Stijn Massar gave a keynote speech at the ASSM (Asian Society of Sleep Medicine) satellite, while Dr. Ju Lynn Ong and Dr. Eva Qin spoke at courses. Dr. Chun Siong Soon won two awards at the ASSM satellite meeting. We presented a record number of oral presentations and posters. We even had a booth to show the Z4IP Ecological Momentary Assessment app that has undergone years of development.

Our 'Rest, Reflect and Recharge' program that was part of the NUS 1000 Staff Edition study led to the creation and distribution of a cartoon series to shape how NUS staff re-envision work-life balance for better wellbeing, health and productivity.

In terms of outreach: Dr. Stijn Massar gave interviews on several sites including Deutsche Welle, Intellect.co and Channel News Asia. I presented at Sleep Grand Rounds at Harvard's Division of Sleep Medicine, keynotes at the Wellcome LEAP and iHealth Tech and also took part in invited talks by Nestle and the West Pacific Rim Consortium on ageing.

SCL

RESEARCH HIGHLIGHTS

Insights about Travel-Related Sleep Disruption from 1.5 Million Nights of Data

In an increasingly interconnected world, more people than ever are flying across time zones, often experiencing sleep disruptions that can persist for several nights. Until recently, collecting objective sleep data from travelers has been difficult, with most studies using a small number of specialist participants, such as air crew or professional athletes. However, with the advent of reliable wearable sleep trackers it is now possible to track sleep patterns of everyday travelers wherever they go in the world.

In this study, we used data from Oura to provide a comprehensive characterization of how travel affects sleep under real-world conditions. We analyzed almost 65,000 trips, crossing different numbers of time zones, measuring sleep two weeks before and after travel. The results showed that while jet lag was a significant source of disruption to sleep timing, other factors also affected sleep. Travelers often woke earlier on the morning of travel to catch their flights, which curtailed their sleep. While sleep duration returned to normal within about 2 days of travel, disruptions in sleep timing and architecture were somewhat slower to recover. This study not only informs us how our sleep might be disrupted during travel, but also illustrates the potential of large scale, naturalistic data collection using wearable devices.

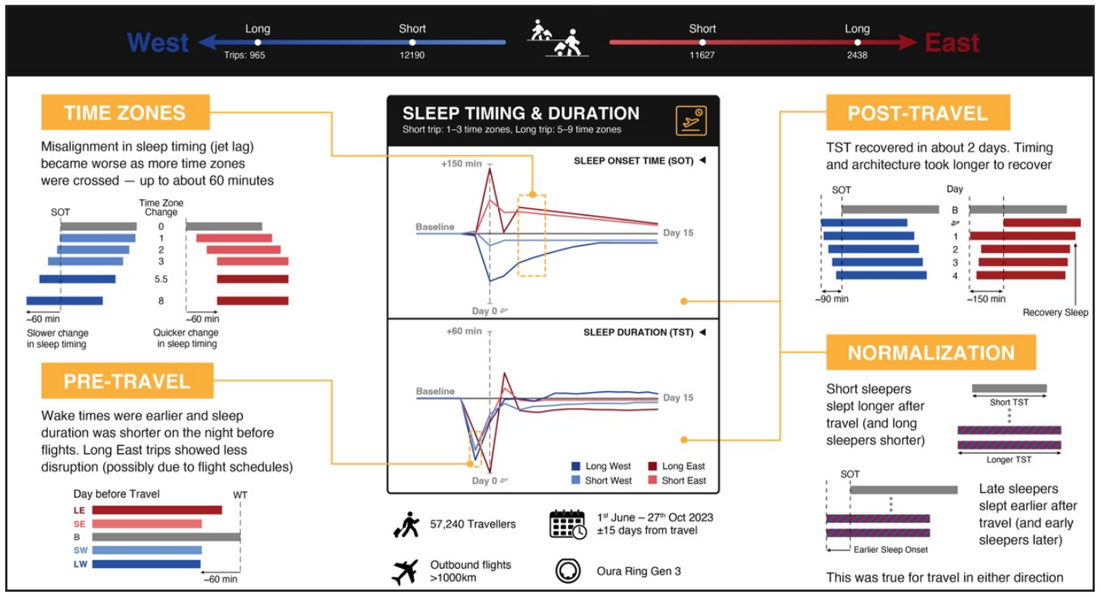


Figure 1. *Graphical abstract*

Why Do So Many of Us Go to Bed Later Than We Meant to?

How do university students plan bedtime and how do these intentions translate into actual sleep behavior? Over 2–4 weeks during term time, students used a smartphone app to record whether they planned a specific bedtime each night, while wearable trackers captured when they really fell asleep and for how long.

We found that students set a bedtime plan only once per week on average. Even when they did plan, they often missed their mark, going to bed about 46 minutes later than intended. Simply having a plan is helpful. On nights with a bedtime plan, students went to bed earlier and slept longer than on nights without a plan. The most common culprits for missing planned bedtimes were studying/working and late-night digital leisure.
Bottom line: planning bedtime is uncommon but powerful—and could be a simple, practical tool for better sleep.

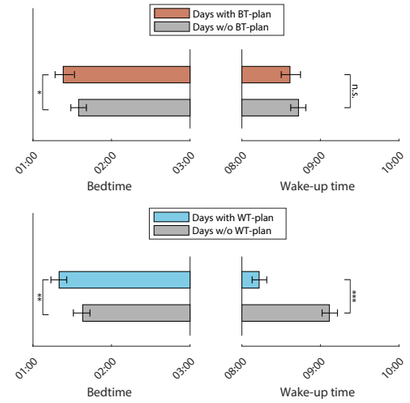


Figure 2. *Day-by-day effects of bedtime and wake-up time planning on sleep timing.*
** p < .05, ** p < .01, *** p < .001*

Slow-wave Brain Activity During Sleep is a Reliable Marker of Cognitive Health in Older Adults

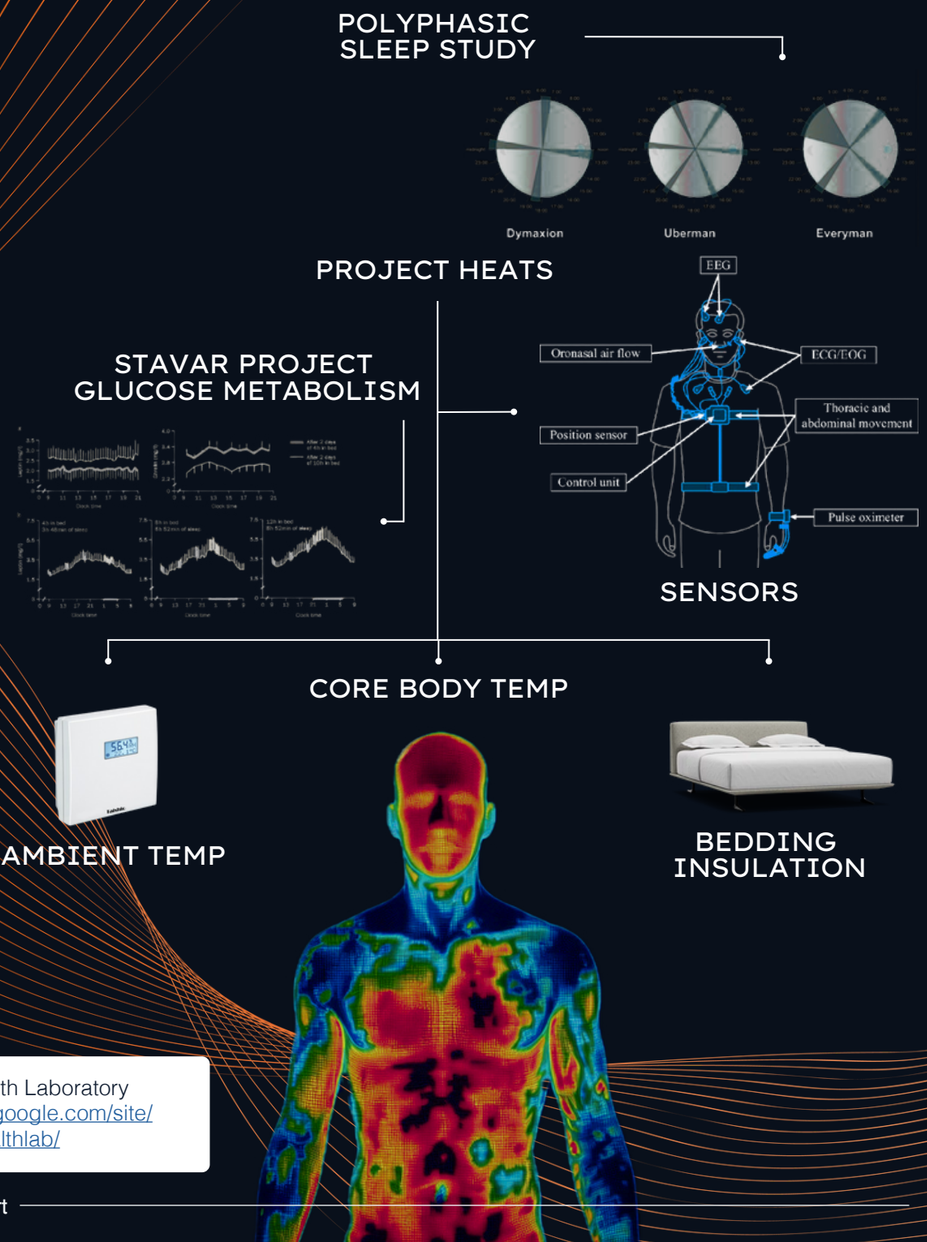
Ensuring that our sleep measurements are relevant to functional outcomes is central to our research. In this study, we examined whether different sleep EEG measures recorded over multiple nights could reliably predict cognitive performance in older adults living in the community.

Forty-nine adults aged 68–80 years wore a wireless EEG headband at home for up to eight consecutive nights, generating over 300 nights of high-quality sleep data. We focused on comparing the traditional “deep sleep” measure (stage N3 sleep) with slow-wave activity (SWA), a measure of the strength of slow brain waves during non-REM sleep.

We found that N3 sleep percent varied substantially from night to night and did not show a consistent relationship with cognition. In contrast, SWA demonstrated high stability across nights and was strongly associated with overall cognitive performance, especially memory and processing speed. These results suggest that SWA is a more reliable and biologically meaningful indicator of brain health than conventional deep sleep measures in older adults.

Importantly, participants were able to independently operate the EEG headband at home with high compliance and comfort, demonstrating the feasibility of large-scale, real-world sleep monitoring. This study highlights the potential of wearable EEG technology to support early identification of cognitive decline and improve our understanding of healthy cognitive ageing.

SHL
SLEEP & HEALTH LABORATORY



Sleep & Health Laboratory
https://sites.google.com/site/sleepandhealthlab/

SLEEP and HEALTH LABORATORY

Asst. Prof. June Lo
SHL Principal Investigator

In modern societies, sleep loss continues to be widespread, with far-reaching consequences for cognitive, physical, and emotional well-being. At the Sleep and Health Laboratory (SHL), we remain committed to understanding the vital role of sleep across the lifespan—from identifying its determinants to uncovering its effects on everyday functioning. Our mission is to advance sleep health, enhance cognitive performance, and promote long-term well-being by pinpointing individuals most at risk and developing practical, evidence-based strategies to improve sleep.

This past year, we reached several important milestones. We concluded and disseminated findings from multiple studies, including the Cross-Cultural Sleep Survey Study, the glucose metabolism component of the STAVAR project examining stable versus variable short sleep across multiple weeks, and the Polyphasic Sleep Study exploring how unconventional short sleep schedules affect sleep and wake performance. We are also in the midst of completing a comprehensive meta-analysis investigating whether one night of partial or total sleep deprivation is associated with deficits in cognitive functions among children and adolescents. Finally, using data from the Growing Up in Singapore Towards healthy Outcomes (GUSTO) cohort, we have found that sleep regularity in the first few years of life is associated with less somatic complaints and thought problems at school age.

As global temperatures continue to rise, we remain committed to addressing sleep challenges posed by climate change through Project HEATS—our ongoing interdisciplinary collaboration with UC Berkeley and the University of Sydney. By examining how heat exposure affects sleep and by developing innovative technological and behavioural solutions, we aim to help individuals maintain good quality sleep in a warming world. Our studies are progressing steadily, with the goal of finishing data collection by mid of next year.

In addition, we continue expanding our research portfolio with new initiatives. For example, we are studying whether sleep facilitates recovery in athletes after their training. Next year, we are launching a project focusing on sleep and daytime functioning during the Ramadan period, providing a unique opportunity to study naturalistic changes in sleep timing, circadian rhythms, alertness, and behaviour in real-world conditions. We will also study the relationship of sleep with emotional and behavioural problems in clinical populations, including preschoolers with anxiety issues and adults with autism spectrum disorder.

With these completed studies, ongoing projects, and new directions emerging, 2025 has been a productive and impactful year for SHL. We look forward to generating actionable insights that advance sleep science and contribute meaningfully to improving daily life.

SHL

RESEARCH HIGHLIGHTS

Glucose Homeostasis During Recurrent Periods of Sleep Restriction and Recovery in Healthy Young Adults

The detrimental effects of sleep loss on glucose tolerance are well established, but how glucose homeostasis changes across multiple weeks of weekday sleep curtailment with weekend catch-up sleep – a common sleep pattern in the modern world – is not clear. Furthermore, sleep-restricted individuals may occasionally catch up with their sleep on weeknights, but such practice increases variability of sleep across nights. Some recent evidence has suggested that the impact of sleep variability on health is beyond that of sleep curtailment. Importantly, how sleep variability affects our bodies' ability to process glucose is unexplored. To address these issues, we conducted a 16-day laboratory study. We found that insufficient sleep on weekdays worsens glucose tolerance, even with weekend catch-up sleep. The regularity of our sleep on weeknights seems to affect how this impairment develops: participants who had 6-hour sleep every weekday showed early signs of insulin resistance, with compensatory hypersecretion of insulin and small increases in plasma glucose concentrations, whereas participants with a more irregular short sleep schedule which fluctuated across 4, 6, and 8 hours across weeknights experienced possible functional impairment of the insulin-producing cells in the pancreas and demonstrated prominent increases in plasma glucose levels without significant compensatory insulin responses. Our study provides further evidence that getting sufficient sleep every night appears to be the only way to ensure our bodies process glucose optimally and reduce our risk of type 2 diabetes.

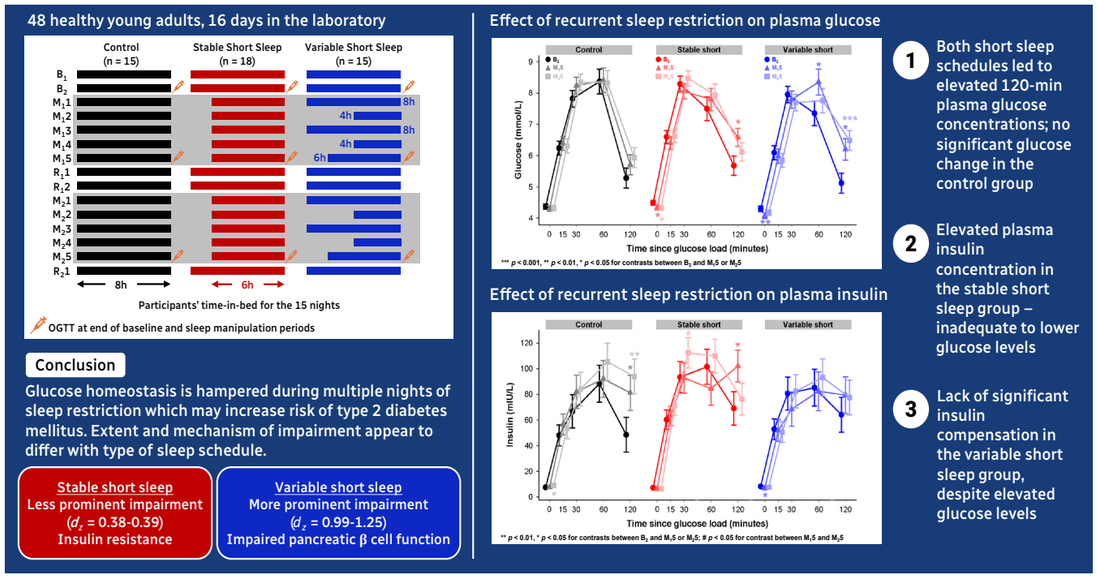


Figure 1. *Insufficient sleep on weekdays worsens glucose tolerance, even with weekend catch-up sleep, and how this impairment develops seemingly depends on the regularity of our sleep on weeknights.*

Neurobehavioural Functions and Sleep Architecture During Polyphasic and Monophasic Short Sleep Schedules

Advocates have claimed that polyphasic sleep – deliberately distributing multiple sleep episodes over a 24-h day, typically with the goal of maximising wake duration –optimises performance, and improves productivity, memory and mood despite the short sleep durations. We investigated this claim by studying how sleep architecture and neurobehavioural functions change during a polyphasic short sleep schedule as compared to a monophasic short sleep schedule with the same total sleep opportunity, as well as to a well-rested schedule.

In young adults, the "Uberman" sleep schedule (six 20-minute naps distributed across a 24-hour day) substantially reduces total sleep duration and sleep efficiency, even when compared to a monophasic sleep schedule with the same overall sleep opportunity, and may result in even greater subjective sleepiness, poorer vigilance and lower positive mood.

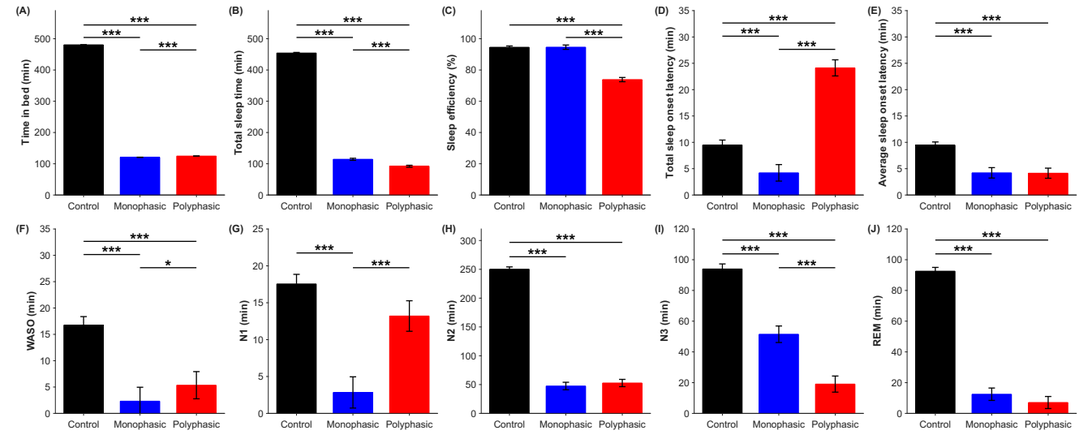


Figure 2. *Sleep differences between well-rested control (8-h time in bed [TIB]), monophasic short sleep (2-h TIB) and polyphasic short sleep groups (6 x 20-min TIB). Polyphasic short sleep group had substantially reduced total sleep time and sleep efficiency even when compared to the monophasic short sleep group.*

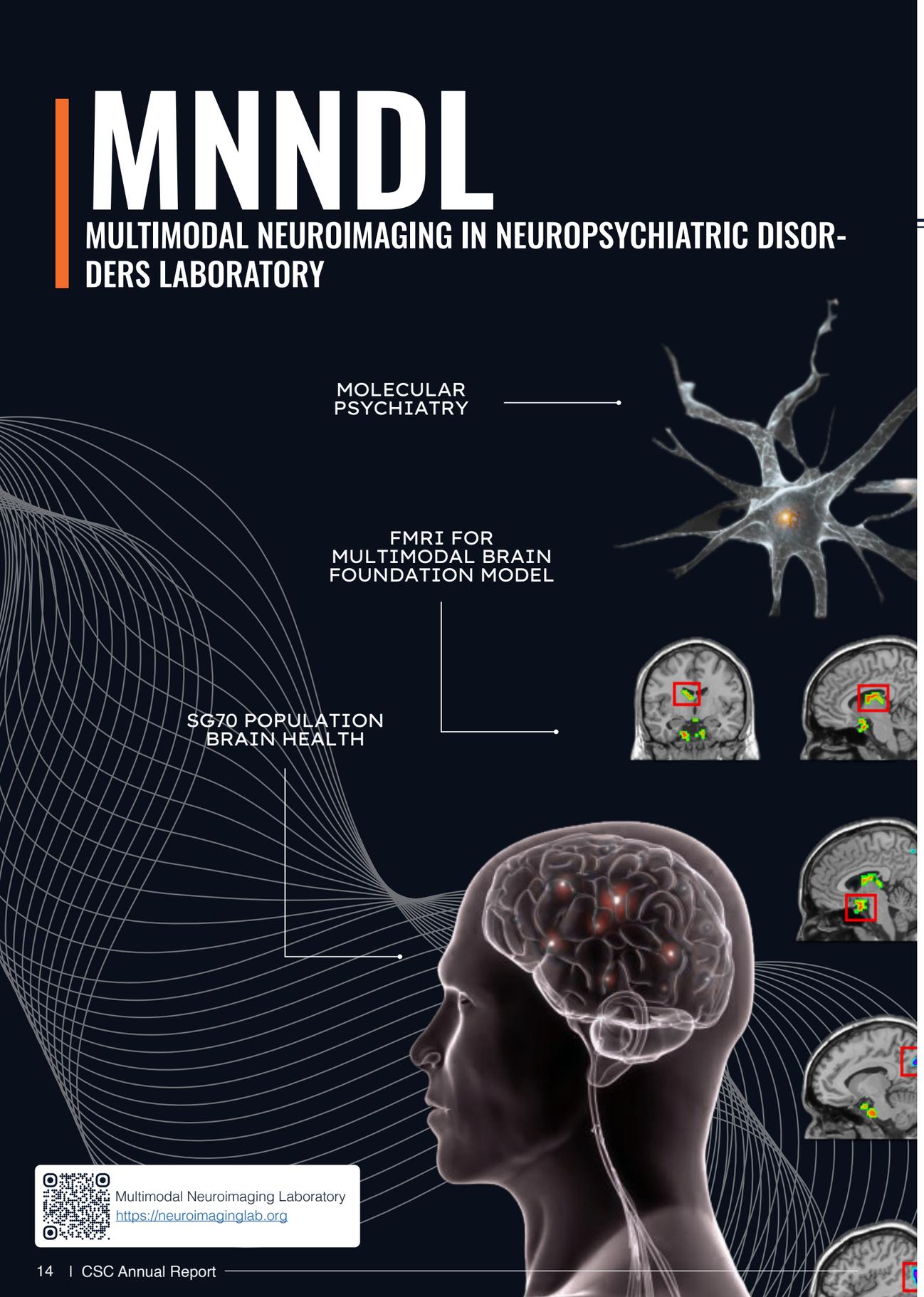
Factors of Sleep Patterns in School-Aged Children: A Cross-Cultural Investigation

Using an online survey, we investigated whether school start times and parent-related factors (parent sleep patterns, sleep hygiene, sleep priority) relate to sleep patterns, on weekdays and weekends, of school-aged children in Singapore, China, and the United States.

Consistently across cultures, later school start times lengthened weekday sleep, and better sleep hygiene had a more prominent relationship with earlier bedtimes on weekends. The relationship of sleep priority with children's sleep patterns could be culture-specific. Delaying school start times, reinforcing family-centered sleep hygiene practices and integrating culture-specific sleep education in future sleep interventions on school-age children may improve their sleep duration and timing.

MNNDL

MULTIMODAL NEUROIMAGING IN NEUROPSYCHIATRIC DISORDERS LABORATORY



Multimodal Neuroimaging Laboratory
https://neuroimaginglab.org

Multimodal Neuroimaging Laboratory

Assoc. Prof. Helen Zhou
MNL Principal Investigator

2025 has been a highly productive and fulfilling year for our lab through close collaborations within CSC and across the broader NUS/NUHS ecosystem.

Our AI for Neuroscience team made outstanding progress. Our deep learning–based, non-invasive brain vision–decoding work has now been cited over 200 times within two years, reflecting its growing impact. This year, we newly developed the first multimodal brain foundation model, Brain Harmony. This model can be efficiently fine-tuned for diverse downstream tasks using limited labeled data, improves interpretability, and integrates seamlessly with routinely available clinical data. Importantly, we have partnered closely with neurologists, psychiatrists, and neurosurgeons to refine and validate these models for clinical applications.

On the neuroscience front, we continued advancing the understanding of brain network phenotypes focusing on early stage of neuropsychiatric disorders. A notable example is our study published this year in Molecular Psychiatry, led by Dr. Cisy Liu. This work examined nearly 3,000 young individuals across 31 international sites, identifying early brain network alterations associated with future psychosis risk—providing important insights into its biological trajectory.

We also made substantial progress in healthy longevity research, with a focus on brain health in population cohorts and intervention studies targeting at-risk groups. We are leading the brain health domain of the SG70 flagship project, linking midlife lifestyle factors A late-life brain health in over one thousand community-dwelling older adults. In parallel, we are leading the multidomain lifestyle intervention for persons at risk of vascular cognitive impairment – SINGER Theme 2 biomarker study. By the end of 2025, we will complete baseline and two-year follow-up assessments for all 1,212 participants. Furthermore, I secured an NMRC Open-Funded IRG to predict long-term outcomes in these SINGER participants using deep learning–based multidimensional brain age models.

Aligned with our emphasis on midlife prevention, we made steady progress in the RESET Brain Study, targeting the brain–heart axis in middle-aged individuals at risk of cardiovascular disease. We also expanded the SG Lifespan project to include NUS staff participants, combining brain imaging with digital health–tracking technologies in collaboration with the Sleep and Cognition Lab.

The achievements of our early-career researchers have been especially gratifying. Senior research scientist Dr. Joanna Chong secured NMRC grant as a young principal investigator to study heart–brain–cognition interactions and exercise effects in hypertensive heart disease. Our PhD students and fellows also received multiple awards and delivered invited talks at leading conferences, and were recognized with honors such as the Too Joon Chew PhD Prize.

We look ahead with confidence and momentum, committed to advancing brain health and AI-enabled neuroscience and medicine, and to translating scientific innovation into meaningful societal impact.

MNNDL

RESEARCH HIGHLIGHTS

Landmark Foundation Models: Brain-JEPA and Brain Harmony

The Brain-JEPA and Brain Harmony (BrainHarmonix) models represent two landmark foundation models advancing AI-driven neuroscience. Brain-JEPA introduces a Joint-Embedding Predictive Architecture (JEPA) for fMRI, using Brain Gradient Positioning to create a functional coordinate system and Spatiotemporal Masking to capture complex brain dynamics. It achieves outstanding performance in demographic, cognitive, and clinical prediction tasks while demonstrating strong cross-ethnic generalizability.

Building on this, Brain Harmony unifies structural morphology and functional dynamics into compact 1D brain-hub tokens, establishing the first multimodal foundation model for neuroimaging. It introduces geometric harmonics–based alignment to couple cortical structure and function, and a novel Temporal Adaptive Patch Embedding (TAPE) to handle heterogeneous fMRI repetition times (TRs). Trained on over 130,000 brain scans, Brain Harmony achieves superior generalization across neurodevelopmental, neurodegenerative, and cognitive tasks, forming a unified, information-dense representation of the human brain.

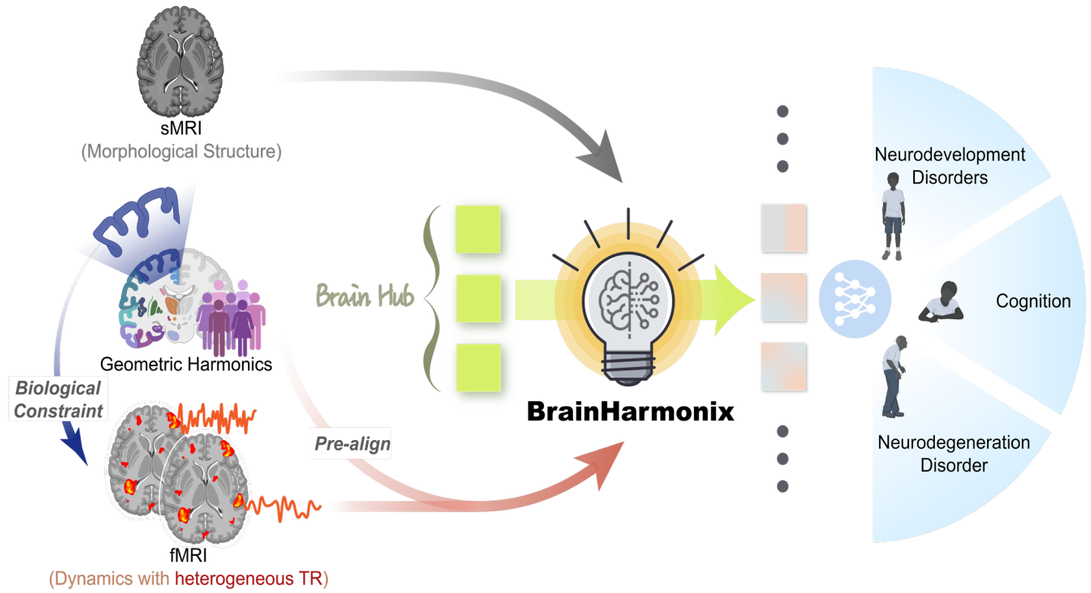


Figure 1. *Overview of Brain Harmony (BrainHarmonix). Brain morphology from T1-weighted MRI (sMRI) and functional dynamics from fMRI are unified into compact 1D brain-hub tokens, which can be readily adapted to downstream tasks via an attached projection head. Specifically, functional dynamics are pre-aligned with group-level geometric harmonics, with built-in flexibility to handle heterogeneous repetition times (TRs). This fusion creates a compact yet expressive representation space that effectively captures the interplay between brain structure and function, supporting a broad range of downstream applications, including neurodevelopmental and neurodegenerative disorder classification and cognition prediction.*

Structural Covariance Network Topology in Individual at Clinical High Risk for Psychosis

Individuals at clinical high risk for psychosis exhibit less optimal brain structural covariance network configurations than controls despite showing only mild clinical symptoms.

Network distinctiveness in frontal and temporal brain areas were linked to who later developed psychosis and how severe their symptoms were, suggesting that brain network patterns may play an important role in the transition to psychosis.

Brain-Computer-Interface (BCI) Based Intervention Increases Brain Functional Segregation in Cognitively Normal Older Adults

BCI-based cognitive training in cognitively normal older adults led to enhanced brain network segregation and organization, particularly within control and subcortical systems.

Reduced subcortical participation coefficients and increased alignment with young-adult network templates were linked to improvements in language and memory, suggesting training helps preserve efficient brain network architecture during aging.

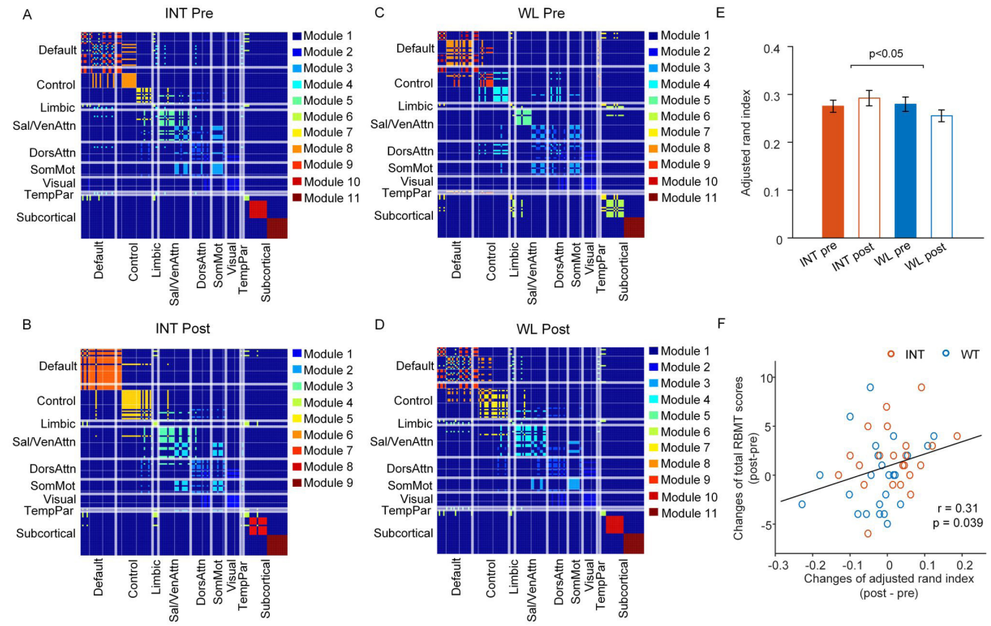
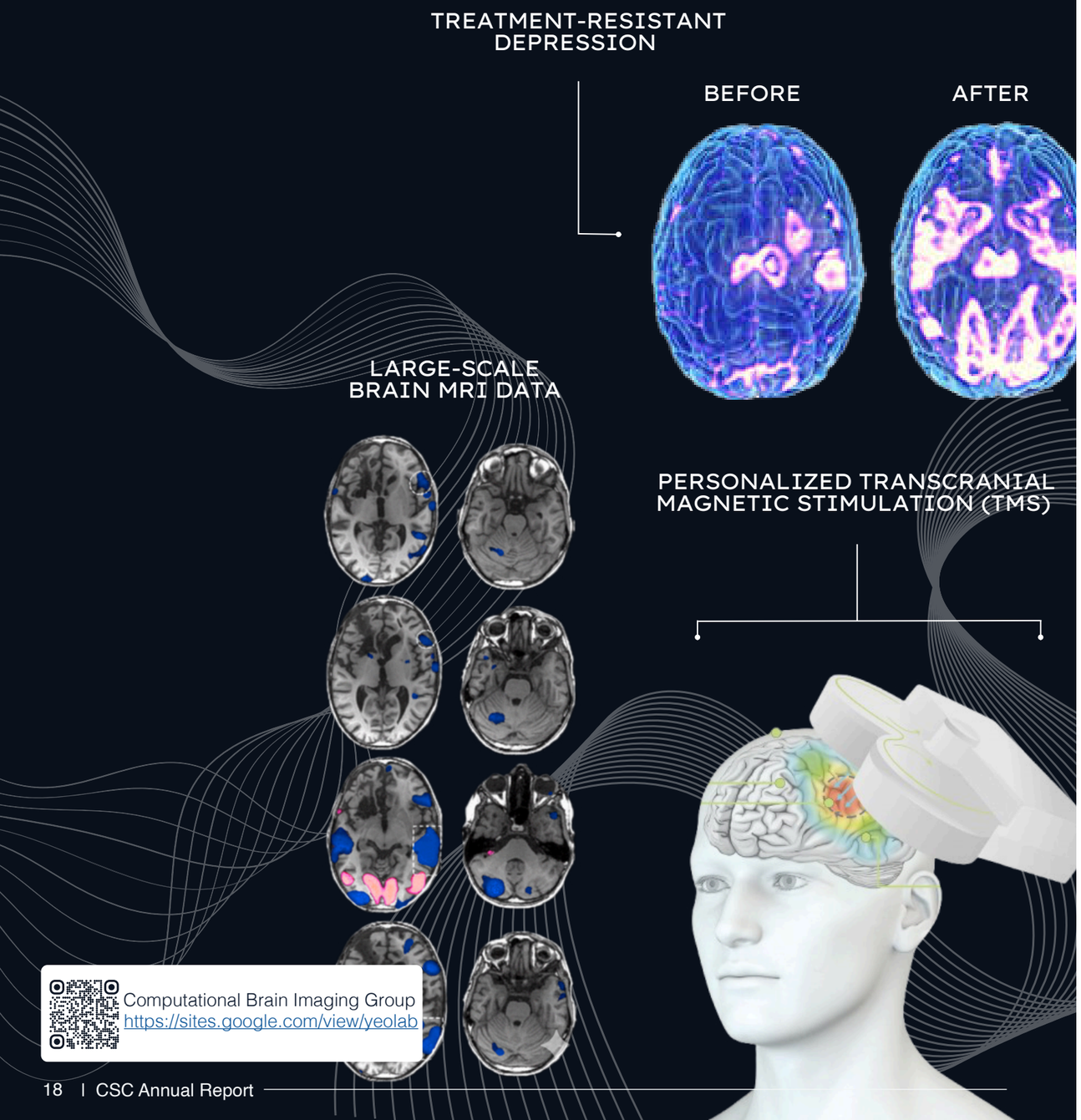


Figure 2. *Altered network architecture following BCI-based intervention in healthy older adults. Consensus matrices illustrating the modular community structures for each group and time point: (A) Intervention group at baseline, (B) Intervention group after the intervention, (C) Waitlist group at baseline, and (D) Waitlist group after the wait period. Nodes within the same community are connected by edges of the same color, highlighting modular organization. E. The similarity between the detected modular architecture and the 144-region parcellation template, evaluated using the adjusted Rand index, revealed a significant group-time interaction effect ($p < 0.05$). Error bars represent standard errors. F. Changes in the adjusted Rand index were positively correlated with improvements in total Rivermead Behavioral Memory Test (RBMT) scores.*

CBIG

COMPUTATIONAL BRAIN IMAGING GROUP



Computational Brain Imaging Group
https://sites.google.com/view/yeolab

Assoc. Prof. Thomas Yeo
CBIG Principal Investigator

Computational Brain Imaging Group

The Computational Brain Imaging Group (CBIG) develops and applies machine learning algorithms to derive neuroscientific insights from large-scale brain MRI data. These population-level insights are in turn used to develop personalized treatments for brain disorders. In the past year, our open label trial on personalized transcranial magnetic stimulation (TMS) for treatment-resistant depression was completed, achieving a 70% response rate. We hope to roll out clinical service at the National University Hospital in early 2026.

A double-blind trial for treatment-resistant depression is ongoing, and we are also starting trials for anxiety and obsessive compulsive disorder. I was awarded the NRF Investigatorship, which allows us to deeply phenotype patients undergoing personalized TMS. In terms of publications, Dr. Leon Ooi, Dr. Csaba Orban and Dr. Shaoshi Zhang were co-first authors in a study published in Nature. Our PLOS Biology study on sleep profiles also garnered widespread media attention, including NBC News, Newsweek, New York Post and CNN.

Dr. Sina Mansour was awarded the NMRC Young Individual Research Grant to expand his work on high-resolution spectral normative modeling. Together with Dr. Leon Ooi, Dr. Ruby Kong and Dr. Phern-Chern Tor, we obtained the National Health Innovation Centre (NHIC) Innovation to Startup (I2Start) grant to further push our technology towards clinical translation. Dr. Sina Mansour, Dr. Ru Kong, Dr. Leon Ooi and PhD student Tianchu Zeng were invited to give talks at various international venues, including the University of Pennsylvania, Harvard Medical School and Dartmouth College.

CBIG

RESEARCH HIGHLIGHTS

AI Scaling Laws for Brain Imaging Data

It is well known that for large language models, prediction performance linearly increases as the logarithm of sample size. However, in many domains, sample size can be number of participants or number of measurements. We show that for functional MRI, prediction accuracy increases with the logarithm of total scan duration, where total scan duration is defined as product of the number of participants and scan duration per participant. Furthermore, by optimizing both sample size and scan duration, we can improve prediction performance while cutting study costs. In particular, 30-min fMRI scans are 22% cheaper than 10-min fMRI scans, while preserving prediction performance.

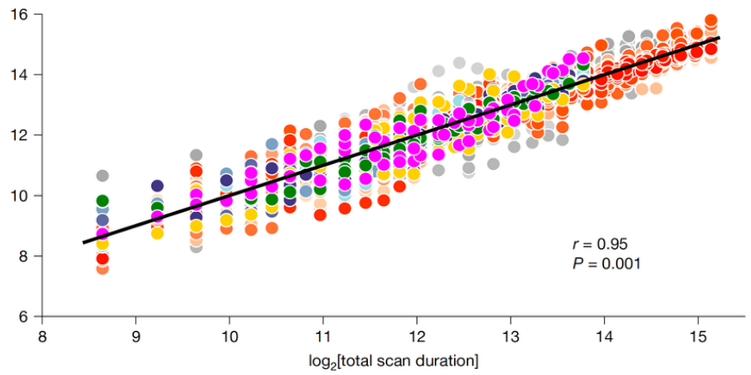


Figure 1. *Normalized prediction performance of 36 phenotypes versus logarithm of total scan duration, ignoring data beyond 20 min of scan time. Total scan duration is defined as the product of the number of participants and scan duration per participant. Prediction performance linearly increases with logarithm of total scan duration (Ooi, Orban, Zhang, et al., 2025).*

Advances in Predicting Dementia Progression

A number of years ago, we took part in the TADPOLE (The Alzheimer's Disease Prediction Of Longitudinal Evolution) challenge. Given a wide range of biomarkers, including MRI, PET, neuropsychological measures and CSF markers, the goal is to predict future Alzheimer's disease progression. At the time of publication, our algorithm was ranked second out of over 90 algorithms (Nguyen et al., 2020). PhD student Zhang Chen recently developed a new algorithm that established a new state-of-the-art in predicting dementia progression (Zhang et al., 2025).

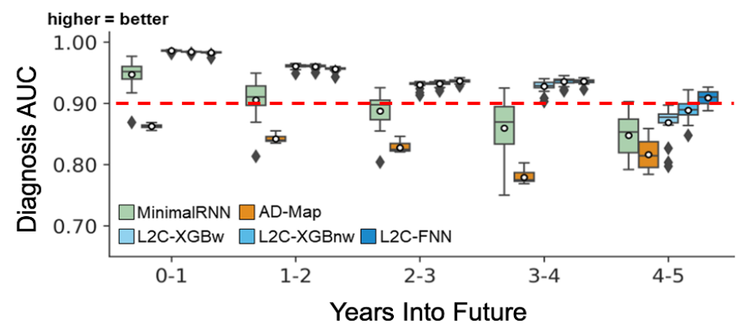


Figure 2. *Here we are trying to predict whether participants will be cognitively normal, mild cognitively impaired or clinically demented up to 5 years into the future. Minimal RNN is our previous algorithm (Nguyen et al., 2020), which was ranked second in the global TADPOLE challenge. Our new models in blue (Chen et al., 2025) perform very well, being able to achieve greater than 90% AUC five years into the future.*

A "Digital Translator" for Brain Studies

The brain can be decomposed into large-scale functional networks, but the specific spatial topographies of these networks and the names used to describe them vary across studies. Such discordance has hampered interpretation and convergence of research findings across the field. Senior research fellow Dr. Ru Kong developed the Network Correspondence Toolbox (NCT) to permit researchers to examine and report spatial correspondence between their novel neuroimaging results and multiple widely used functional brain atlases. The adoption of NCT will aid reproducibility and facilitate comparisons between studies to produce interdisciplinary insights.

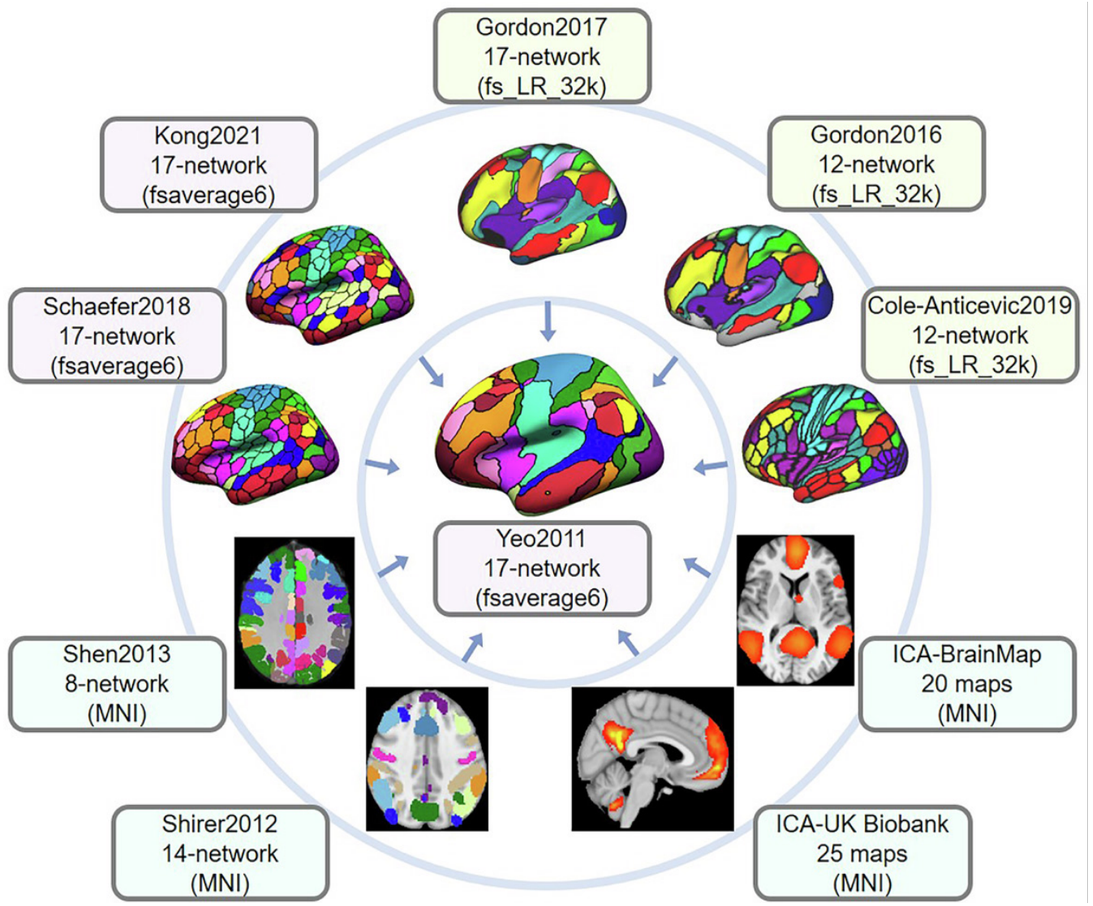
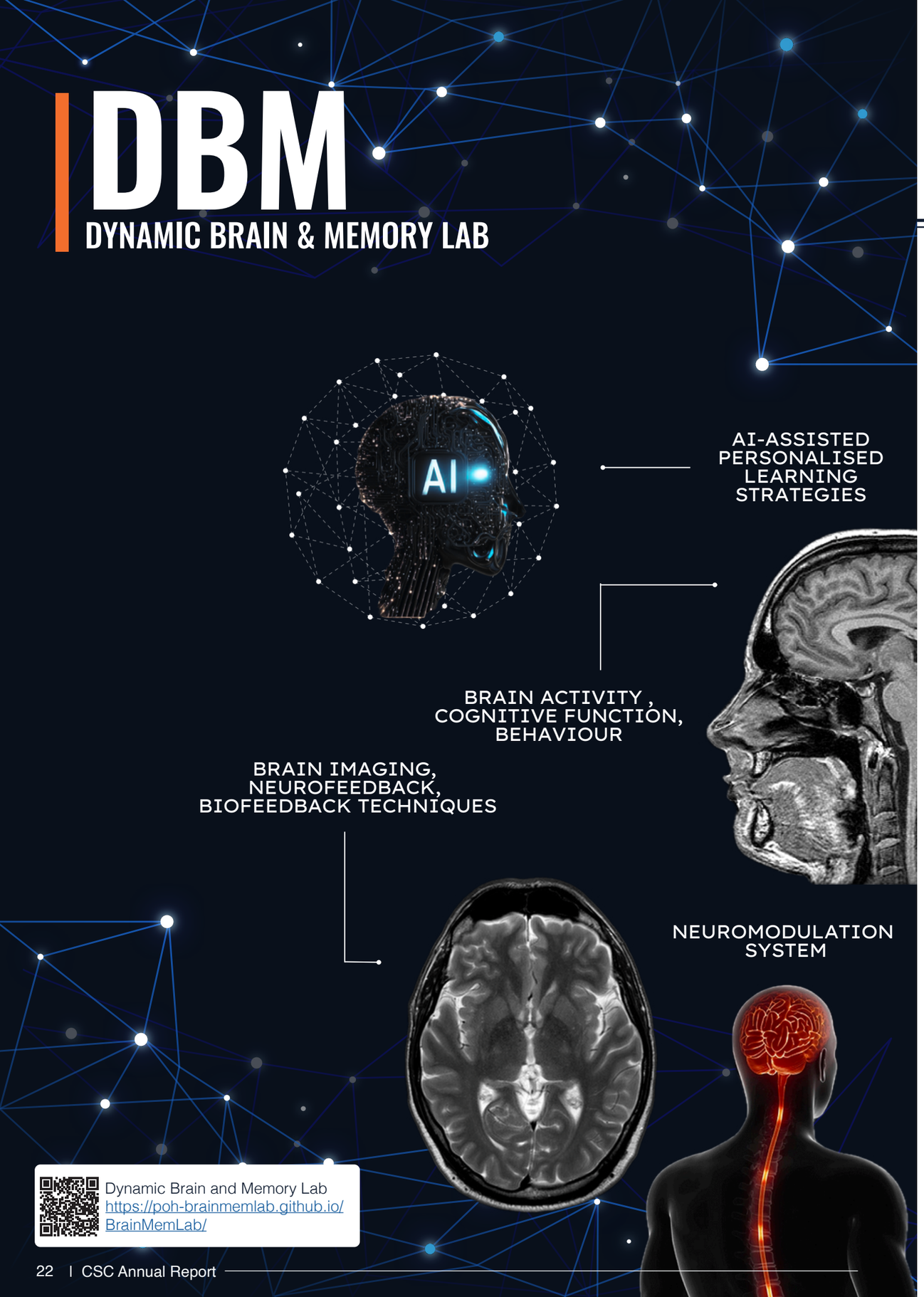


Figure 3. *The NCT is a toolbox that facilitates exploration of network correspondences across multiple functional network atlases as well as quantitative comparison of novel neuroimaging results with multiple atlases (Kong et al., 2025). Ten atlases are shown here for illustration purposes. In this example, the Yeo 17-network atlas in fsaverage6 space (center) serves as the reference atlas. All other surrounding atlases in different spaces are projected to the fsaverage6 space to compute overlap with the reference networks.*



Research Assistant Prof. Jia-Hou Poh

DBML Principal Investigator

It has been an exciting first year for the Dynamic Brain and Memory Lab! The lab is founded with the goals of applying fundamental research in cognitive neuroscience towards application in clinical and educational settings. In our first year, we have made significant progress in establishing the groundwork for this pursuit, and I am deeply grateful to have welcomed our first two lab members, Kai Li and Natasha, who have been integral in driving our research forward.

In the past year, we have focused on establishing two main lines of investigation. The first seeks to understand the function of neuromodulatory systems and how they shape affect, behavior, and cognition. By combining brain imaging with neurofeedback and biofeedback techniques, we aim to explore whether individuals can learn to regulate their own brain activity to effect changes on cognitive functions. This research has the potential to guide the development of novel, non-invasive interventions for neuropsychiatric and neurodegenerative diseases.

Our second major focus is on the role of AI in promoting motivation and curiosity. Our current work investigates how AI usage can both shape and be shaped by individual motivation for learning. This work will inform the development of AI-assisted personalised learning strategies to foster lifelong curiosity. These studies performed in collaboration with partners at the National Institute of Education, are multi-faceted involving both controlled experiments and community-based data collection to ensure our findings are readily translatable for impact in the classroom.

The closing of our first year was also marked by the acceptance of a major theoretical review in the Annual Review of Psychology. By synthesizing findings from neurobiology, computational neuroscience, psychology, and psychiatry, we proposed a novel framework for understanding how motivation influences learning and memory. This work sets a theoretical foundation for the lab's research and provides a multi-scale framework that is applicable across disciplines. In the coming year, we look forward to sharing the first set of results from our work on AI in education, and we will continue to identify potential collaborators to further expand our research into AI-assisted behavioral modifications within the clinical space.

DBM

RESEARCH HIGHLIGHTS

Motivation as Neural Context for Adaptive Learning and Memory Formation

Our recent theoretical work, published in the Annual Review of Psychology, explores how different motivational states create distinct neural contexts for learning. We propose a framework distinguishing between two motivational moods: an Interrogative mood associated with the dopaminergic system, which facilitates flexible, relational memories; and an Imperative mood associated with the noradrenergic system, which promotes learning for immediate goal attainment. This highlights the importance of designing learning contexts that align with desired outcomes by adaptively shaping motivational states.

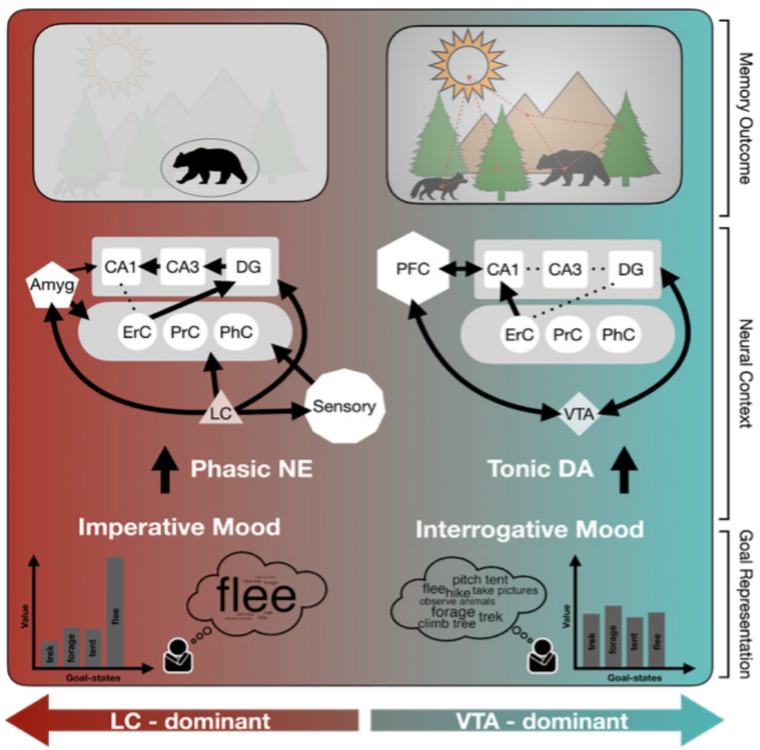


Figure 1. *Schematic depiction of the Neural Context Model. Under an Imperative motivational mood, in which motivation is driven by a single highly salient goal-state, phasic noradrenaline (NE) from the Locus Coeruleus promotes a neural context involving the LC, Amygdala, neocortical Medial temporal lobe, and sensory cortices, forming a unitized memory for the salient goal-relevant item. In contrast, under Interrogative mood, motivation is supported by multiple goal-states, and tonic dopamine (DA) from the VTA promotes a neural context involving the VTA, PFC, and hippocampus (CA1, CA3, DG) to form context-rich relational memories.*

Learning with AI Chatbots

With gen-AI chatbots becoming integral to education, this study investigates their role in student learning. We aim to characterize the tasks learners assign to chatbots and identify patterns of interaction that are most effective for learning.

This work seeks to develop evidence-based strategies for optimizing AI as a tool for effective, self-directed learning and the development of curiosity.

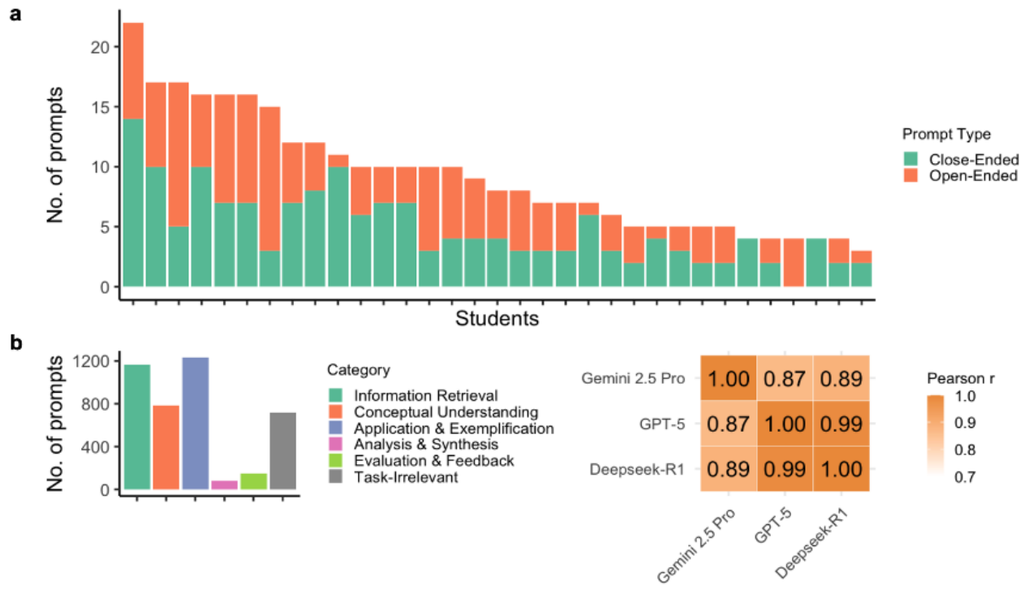


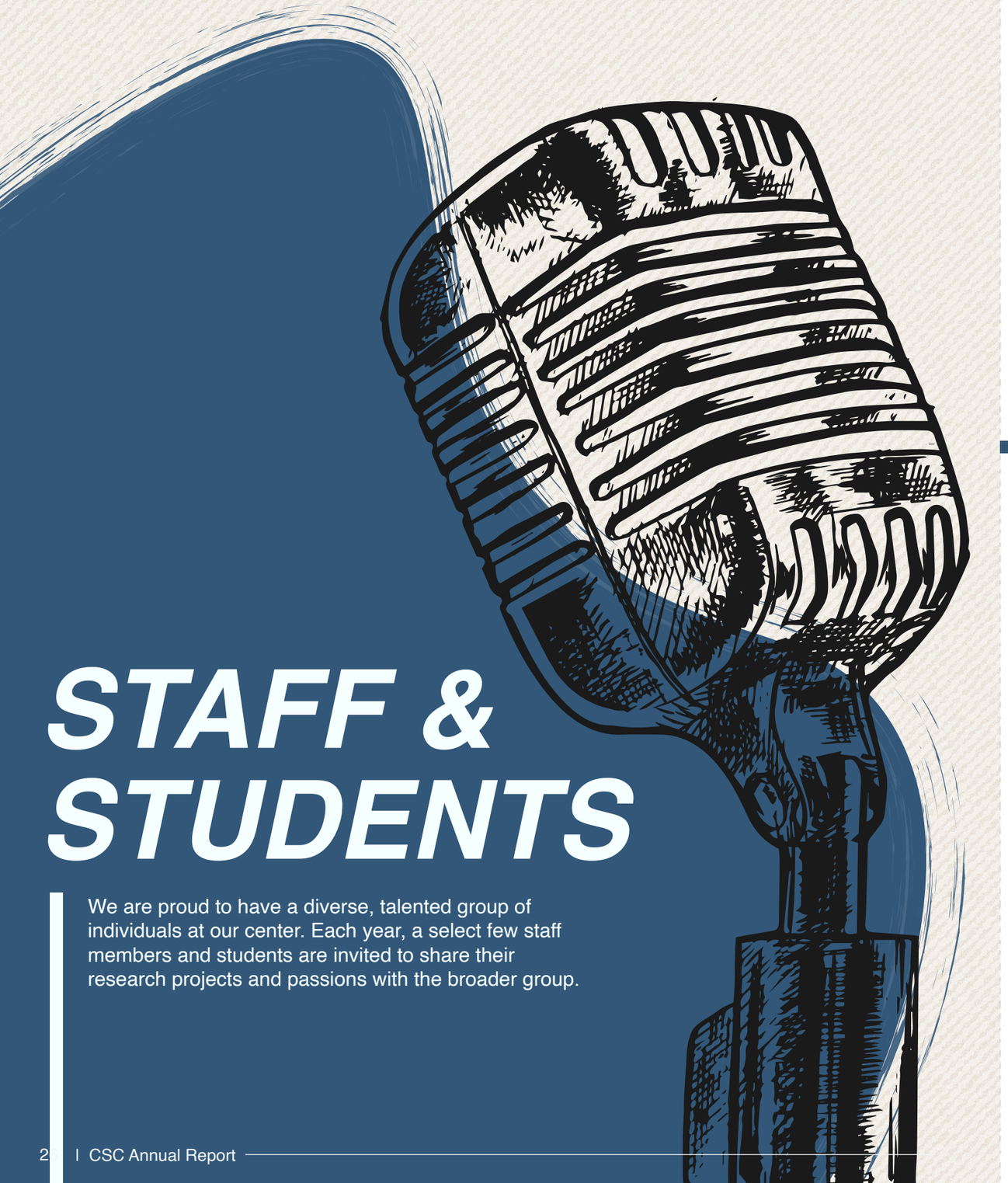
Figure 2. *Gemini 2.5 Pro, GPT-5 and Deepseek-R1 were prompt-engineered to categorize student-chatbot interactions. (a) Distribution of open and close-ended prompts in a sample class module labeled by Gemini 2.5. Students tended to ask more close-ended questions, but there was considerable individual variability. Ongoing analyses would clarify its association with trait curiosity and learning outcomes. (b) Frequency of cognitive intent categories (derived from the revised Bloom's taxonomy) across all prompts. Students primarily used Gen-AI chatbots for lower-order tasks involving information retrieval, comprehension, and application. This may in part be due to the nature of the class assignment in our dataset. (c) Correlation of cognitive intent labeling between three Large Language Models (LLMs). The three models showed high consistency in their labelling, demonstrating LLMs' potential for analysing large-scale naturalistic text data.*

Influence of Neuromodulatory Regulation on Brain Dynamics

The hippocampus exhibits dynamic states crucial for memory, yet how these are influenced by neuromodulatory nuclei like the VTA and LC remains unclear.

Our current work uses a Hidden Markov Model (HMM) approach to characterize these changing brain states and to understand how the underlying dynamics are linked to neuromodulatory activity. This work aims to inform the association between neuromodulatory dysfunction and memory-related disorders.

FEATURED



STAFF & STUDENTS

We are proud to have a diverse, talented group of individuals at our center. Each year, a select few staff members and students are invited to share their research projects and passions with the broader group.

RESEARCH FELLOW
DR. EVA QIN SHUO

Dr. Eva Qin is a Research Fellow from the Sleep and Cognition Laboratory.

COULD YOU BRIEFLY DESCRIBE YOUR BACKGROUND?

I trained in Cognitive Neuroscience and completed my PhD at the University of Texas at Dallas, where I worked extensively on cognitive interventions in older adults, focusing on ways to enhance memory and cognitive functioning in later life. Through this work, I developed a strong interest in understanding how targeted strategies can improve everyday functioning and quality of life for ageing individuals.

WHAT IS YOUR AREA OF RESEARCH?

My research examines the links between sleep, 24-hour movement behaviours, and cognitive and brain health across adulthood, with a particular focus on ageing populations. I am especially interested in improving the quality of life of older adults through evidence-based lifestyle interventions that support healthy and independent ageing.

WHY IS THIS WORK IMPORTANT?

With rapidly ageing populations worldwide, maintaining quality of life in later years has become a key public health priority. Sleep and daily activity patterns are modifiable behaviours that play a crucial role in shaping physical, cognitive, and emotional well-being. By identifying lifestyle strategies that support brain health, my work contributes to practical, preventative approaches that help older adults remain independent and engaged for longer.

WHAT INSPIRED YOU TO CHOOSE THIS FIELD OF STUDY, AND WHY DID YOU CHOOSE TO DO YOUR RESEARCH HERE?

I have always been fascinated by how simple, everyday behaviours like sleep and movement can profoundly influence long-term health and wellbeing. The idea that we can improve quality of life through small, sustainable lifestyle changes motivated me to pursue research at the intersection of ageing, neuroscience, and behavioural health. The Centre for Sleep and Cognition at NUS offers a highly collaborative and interdisciplinary environment, with strong expertise in sleep science, ageing research, and population health. Being part of this ecosystem allows me to work with well-characterised ageing cohorts and translate scientific findings into meaningful, real-world applications for older adults.

WHAT ARE THE LONG-TERM GOALS OF YOUR RESEARCH?

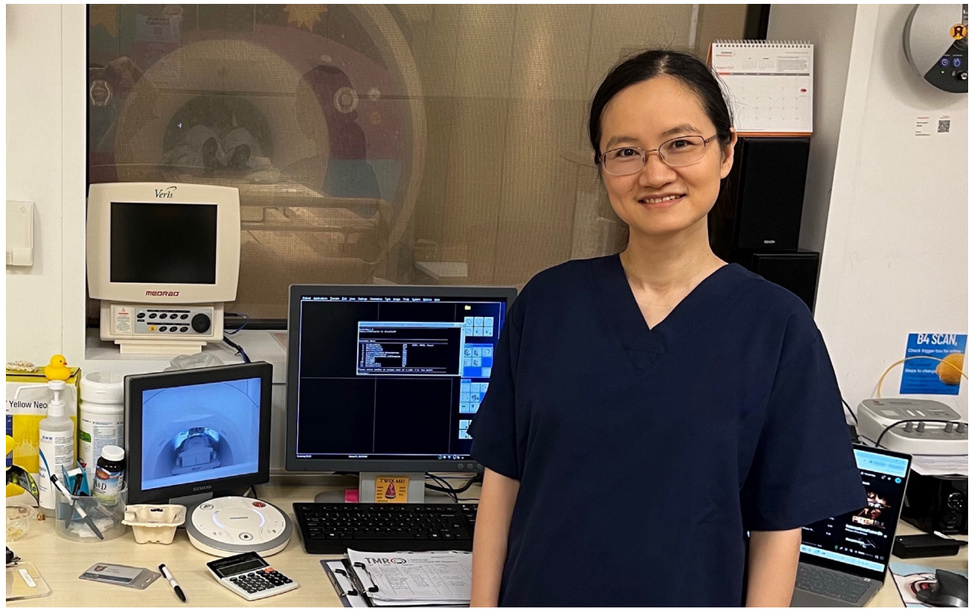
My long-term goal is to develop scalable, evidence-based lifestyle interventions that enhance cognitive resilience and overall quality of life in older adults. I aim to contribute to personalised approaches that help individuals adopt sustainable habits supporting healthy brain ageing and functional independence.

WHAT ARE SOME OF THE BEST EXPERIENCES THAT YOU HAVE HAD IN THE LAB?

I enjoy the dynamic nature of working in a lab with diverse projects, which continually challenges me and exposes me to new ways of thinking about science. I am also grateful for the opportunity to attend conferences and share our research with international audiences, as these experiences have been both professionally inspiring and personally rewarding.

WHAT ARE SOME HOBBIES THAT YOU DO IN YOUR SPARE TIME?

In my spare time, I enjoy hunting for good restaurants and unwinding with true crime documentaries.



SENIOR RESEARCH FELLOW

DR. CISY LIU

Dr. Cisy Liu is a Senior Research Fellow from the Multimodal Neuroimaging in Neuropsychiatric Disorders Laboratory.

COULD YOU BRIEFLY DESCRIBE YOUR BACKGROUND?

My background is in psychology, specifically cognitive neuroscience. I obtained my PhD from the Department of Psychology at the National University of Singapore (NUS). I then joined the Multimodal Neuroimaging in Neuropsychiatric Disorders Laboratory (MNNDL) in CSC and later the Centre for Translational Magnetic Resonance Research (TMR).

WHAT IS YOUR AREA OF RESEARCH?

My current research focuses on neuropsychiatric disorders. Using multimodal neuroimaging methods, I study human brain networks involved in the development of these disorders across different populations, ranging from adolescents to the elderly.

WHY IS THIS WORK IMPORTANT?

Mental health conditions—ranging from severe psychosis to common depression—impose substantial burdens on individuals. These disorders often develop gradually, creating a critical window for early intervention. To support earlier targeted interventions, focusing on a single "faulty" brain region is insufficient, as broader network disruptions occur. Identifying brain-network–based biomarkers that track the gradual network changes may offer the opportunity to improve outcomes and reduce the long-term impact of illness.

WHAT INSPIRED YOU TO CHOOSE THIS FIELD OF STUDY?

Studying psychology often made me wonder about the biology behind it. It is fascinating to see how brain structure, neural activity, and physiological signals give rise to complex behaviours. This work becomes even more meaningful when insights into these biological patterns can be translated into ways to alter disease trajectories and improve lives.

WHY DID YOU CHOOSE TO DO YOUR RESEARCH HERE?

My colleagues come from highly diverse backgrounds, which is essential in my field because it brings together different perspectives and areas of expertise to drive meaningful and impactful research. The resources are extensive, and the leadership is genuinely supportive, enabling me to pursue the questions I care about with confidence.

WHAT ARE THE LONG-TERM GOALS OF YOUR RESEARCH?

There is still so much to explore in this field. With the recent advances in cutting-edge methods, I hope to gain a deeper understanding of disease progression and how these insights can be translated from bench to bedside.

WHAT ARE SOME OF THE BEST EXPERIENCES THAT YOU HAVE HAD IN THE LAB?

I love interacting with people from diverse backgrounds and constantly learning from their experiences. The team is incredibly supportive and inspiring, which makes it exciting to tackle challenges and achieve great work together. I also have the opportunity to connect not just with my immediate colleagues but also with leading experts around the world, broadening my perspective and fuelling my growth.

WHAT ARE SOME HOBBIES THAT YOU DO IN YOUR SPARE TIME?

Sipping tea while reading a good book is my favourite getaway. But nowadays it's more feasible to read from Libby. I also join annual reading challenges on Goodreads.

Dr. Arjun Bolem is a part-time PhD Student from the Multimodal Neuroimaging in Neuropsychiatric Disorders Laboratory

COULD YOU BRIEFLY DESCRIBE YOUR BACKGROUND?

I'm a consultant neurosurgeon at the National University Hospital, Singapore, with a subspecialty focus on skull-base and cerebrovascular disease. My clinical work runs in parallel with translational research that bridges operating theatre insights, advanced neuroimaging, and neuromodulation to improve patient outcomes.

WHAT IS YOUR AREA OF RESEARCH?

I am currently involved in two projects, both focused on enhancing patients' functional and cognitive outcomes through neuroscience and AI interventions. Project 1 tests whether augmenting cervical lymphatic outflow via LVA can enhance glymphatic clearance and cognition in Alzheimer's Patients. Project 2 evaluates a peri-ictus neuromodulatory strategy in aneurysmal SAH to reduce vasospasm and Delayed Cerebral Ischemia (DCI). Across both, we integrate neuroimaging and machine-learning analytics to generate actionable biomarkers.

WHY IS THIS WORK IMPORTANT?

Neurodegeneration and SAH share a common challenge: secondary injury that current therapies only partially address. If LVA measurably improves 'brain waste' clearance and cognition, it opens a surgical, anatomy-based avenue for modifying disease biology. If neuromodulation reduces DCI, we shift from purely reactive treatment strategy to one that can "predict and prevent".

WHAT INSPIRED YOU TO CHOOSE THIS FIELD OF STUDY?

Daily exposure to patients whose outcomes depend on what happens after the index event—glymphatic failure, vasospasm—pushed me to look beyond lesion removal and vessel repair. Seeing converging evidence for lymphatic-glymphatic pathways and for autonomic neuromodulation made it clear we could borrow from vascular surgery and neuromodulation to change trajectories.

WHY DID YOU CHOOSE TO DO YOUR RESEARCH HERE?

The NUHS–NUS ecosystem uniquely couples a high-volume neurovascular service with advanced imaging, biomedical engineering, and AI expertise. Being able to move from operating room to imaging core to data science support within the same campus accelerates iterative clinical–lab–clinical translation and multi-disciplinary mentoring.

WHAT ARE THE LONG-TERM GOALS OF YOUR RESEARCH?

I hope to make progress in my area of research and hopefully complete my PhD!

WHAT ARE SOME OF THE BEST EXPERIENCES THAT YOU HAVE HAD IN THE LAB?

Just trying to make friends and trying to speak the same research lingo – it is a work in progress but it is heartening to make progress week on week.

WHAT ARE SOME HOBBIES THAT YOU DO IN YOUR SPARE TIME?

Neurosurgery takes up most of my time. Balancing a full clinical practice with a part time PhD has been challenging but I cherish my time with family, friends and going on the occasional snowboard trip. These keep me grounded and creative for the next experiment—and the next case.

DR. ARJUN BOLEM

PHD STUDENT

DR. NATASHA TAYLOR

RESEARCH FELLOW

Dr. Natasha Taylor is a Research Fellow from the Dynamic Brain and Memory Laboratory.

COULD YOU BRIEFLY DESCRIBE YOUR BACKGROUND?

I completed my Bachelor of Medical Science (Major in Neuroscience) with First Class Honours in 2019 at The University of Sydney. Subsequently, I continued my studies in neuroscience by completing a PhD (Nov, 2024) under the supervision of Prof. Mac Shine at The University of Sydney. Then, I worked as a postdoctoral research associate under joint supervision with Prof. Robert Sanders and Prof. Mac Shine. I have now joined Assistant Prof. Poh as a research fellow at the Dynamic Brain & Memory Lab.

WHAT IS YOUR AREA OF RESEARCH?

My research focuses on the role of the ascending arousal system in facilitating dynamic brain state transitions in both healthy and diseased brains, and how these brain state transitions are critical for normal brain function and cognition. More specifically, I have worked on characterising role of the cholinergic and noradrenergic systems in facilitating global brain state dynamics by applying concepts from statistical physics, multi-modal neuroimaging analyses, neural mass modelling and task-based fMRI studies to interrogate how the brain functions as an interacting complex system. In my current role, I will leverage large-scale neuroimaging datasets to examine neuromodulatory influences in brain dynamics, with a focus on their role in memory function.

WHY IS THIS WORK IMPORTANT?

This research is important because it attempts to connect theories of cognitive function to underlying mechanisms of neural activity. At this stage, there has been large efforts to understand the mechanisms of neuropathology and cognitive decline in ageing populations – but little is known about normal cognition to extrapolate these findings and build on models and understanding of normal cognitive function in the brain.

WHAT INSPIRED YOU TO CHOOSE THIS FIELD OF STUDY?

I joined this field because I commenced an undergrad. research project with Prof. Mac Shine and had an undying curiosity to understand these tiny nuclei in the brainstem and how they could so broadly influence brain activity. I think the inherent curiosity has continued to be fostered by how little we know about our own brains.

WHY DID YOU CHOOSE TO DO YOUR RESEARCH HERE?

I chose to move overseas and expand my research experience/collaborations and found CSC had a brilliant group of researchers working on similar questions that I'm passionate about working on.

WHAT ARE THE LONG-TERM GOALS OF YOUR RESEARCH?

My long-term goal is to build a comprehensive theory of how the 4 major ascending arousal nuclei influence global brain dynamics across mulit-modal datasets that integrate systems neuroscience and cognitive function in health and disease. I hope to build upon this work to characterize conditions of ascending arousal pathology, specifically in the case of Alzheimer's and Parkinson's disease.

WHAT ARE SOME OF THE BEST EXPERIENCES THAT YOU HAVE HAD IN THE LAB?

So far, after only being in the lab for a couple of months – my best experiences have been in the journal club discussions; it is very insightful and interesting to engage in open discussions about novel work within the field and I have felt immensely welcomed by the other teams that have invited me to attend their journal clubs and contribute to open discussions about best scientific practices.

WHAT ARE SOME HOBBIES THAT YOU DO IN YOUR SPARE TIME?

I'm big into hiking – and plan an annual multi-day hiking trip where I can get lost in the wilderness and take in all the beauty of nature's surroundings. On my weekends, I have a new found-joy of baking sourdough!

RESEARCH ASSISTANT

KAI LI NG

Kai Li Ng is a Research Assistant from the Dynamic Brain and Memory Laboratory.

COULD YOU BRIEFLY DESCRIBE YOUR BACKGROUND?

I graduated with a BSocSci (Hons) in Psychology earlier this year! I've always been a "try everything" person so my experience is a little patchworky. Most generally, I've worked with babies, children and adolescents in research and clinical settings. My thesis investigated developmental differences in premature infants' cognition; and a separate study I did investigated the intergenerational transmission of negative parenting. I also completed an internship at the Institute of Mental Health's Department for Developmental Psychiatry, and volunteered regularly at a SPED school. Additionally, I dabbled in defence research with DSO National Laboratories, and a little of psycholinguistics with B.L.I.P Lab.

WHAT IS YOUR AREA OF RESEARCH?

Currently, I'm interested in the constructs of learning, memory and curiosity. With the Dynamic Brain & Memory Lab, my recent focus has been on identifying behavioural patterns of curiosity and learning in naturalistic samples, as well as antecedents and implications of these patterns. Additionally, I'm interested in exploring the neural substrates of ageing memory, while leveraging recent advances in NLP and multimodal models.

WHY IS THIS WORK IMPORTANT?

I've always thought that realising one's potential, and achieving a life well-lived, rests on our ability to remember who we are, as well as how we learn and grow from our experiences. Memories are fundamental to our identities, and let us adapt to new experiences. On a related note, curiosity is such an underrated superpower!

WHAT INSPIRED YOU TO CHOOSE THIS FIELD OF STUDY?

It's so hard to pin down a single factor. Everything just kind of amalgamated into a intense curiosity for why people do the things that they do, and why people are the way they are. I took Psychology in undergrad to satisfy my curiosities, but found myself constantly questioning what these theories and constructs' biological underpinnings were.

WHY DID YOU CHOOSE TO DO YOUR RESEARCH HERE?

My interview with Dr. Poh actually sold me. He was very forthcoming and generous with his knowledge, and had clear passion for his area of study. I had never attended an interview where I walked out much more learned and brimming with further curiosities and questions. I was confident he would be a great mentor!

WHAT ARE THE LONG-TERM GOALS OF YOUR RESEARCH?

I'm a little early in my journey for this, but eventually, I'd love for my findings or methods to be applied by practitioners, educators or other researchers. As long as my work may be applied and do good for others, I'd be happy.

WHAT ARE SOME OF THE BEST EXPERIENCES THAT YOU HAVE HAD IN THE LAB?

I love our journal clubs. The papers we have covered have always been really cool, and the senior researchers always provide their takes and opinions which are fascinating to hear. Additionally, we always go off-tangent towards the end and wind up discussing unrelated but equally thought-provoking ideas.

WHAT ARE SOME HOBBIES THAT YOU DO IN YOUR SPARE TIME?

Gymming and running are therapeutic staples for me. I also sing in an acapella group and am a fan of musical theatre. I love cooking and hosting dinner parties. Sometimes I handmake jewellery. Most often, I'm a "do-nothing" hobbyist.

HETU LI
PHD STUDENT

Hetu Li is a PhD student from the Computational Brain Imaging Group.

COULD YOU BRIEFLY DESCRIBE YOUR BACKGROUND?

I grew up in China and later moved to the UK for my undergraduate and master's studies. I earned my bachelor's degree in mathematics from Cambridge in 2023, followed by a master's degree in Statistics (Data Science) from Imperial College London the next year. My strong belief in the mutual potential of machine learning and neuroscience has led me to pursue a PhD in this field.

WHAT IS YOUR AREA OF RESEARCH?

My research focuses on identifying and understanding common statistical inference errors in published life science papers. It is not uncommon for researchers to overlook the statistical correlations between the results they report and the subsequent tests they perform, which can lead to inflated false positive rates.

WHY IS THIS WORK IMPORTANT?

Many life science researchers may not have the statistical background to recognize how correlated results can distort p-values and lead to unreliable conclusions. Without addressing this issue, academia risks producing findings that appear statistically significant but are in fact misleading.

WHAT INSPIRED YOU TO CHOOSE THIS FIELD OF STUDY?

My interest in neuroscience began in my sophomore year when I first encountered the Hodgkin–Huxley model of neuronal activity and the Bayesian framework underlying human decision-making. Later, as I studied deep learning, I was fascinated by how the brain's energy efficiency, sparsity, and plasticity differ from modern supervised models. This contrast inspired me to explore the intersection between neuroscience and machine learning more deeply.

WHY DID YOU CHOOSE TO DO YOUR RESEARCH HERE?

I wanted to approach problems from a neuroscientist's perspective and work in a truly interdisciplinary environment. The diversity of expertise here is invaluable-collaborating with people who not only analyse data but also understand its biological origins has been particularly enriching for me.

WHAT ARE THE LONG-TERM GOALS OF YOUR RESEARCH?

One goal is to develop more reliable statistical inference methods for situations where data is limited, which is common in neuroscience. A more aspirational goal is to build a stronger bridge between neuroscience and modern deep learning research, fostering deeper cross-disciplinary understanding.

WHAT ARE SOME OF THE BEST EXPERIENCES THAT YOU HAVE HAD IN THE LAB?

I really enjoy our weekly journal club. It's a great opportunity to hear about recent advances in areas such as large language models for tabular data, biophysical modelling, and cognitive neuroscience. I especially value the lively discussions and thought-provoking questions that arise during these sessions.

WHAT ARE SOME HOBBIES THAT YOU DO IN YOUR SPARE TIME?

I love reading novels in my free time, and I enjoy experimenting with different coffee brewing styles every day.

PHD STUDENT
TIAN CHU ZENG

Tian Chu Zeng is a PhD student from the Multimodal Neuroimaging in Neuropsychiatric Disorders Laboratory.

COULD YOU BRIEFLY DESCRIBE YOUR BACKGROUND?

I obtained my bachelor's degree from the Department of Automation at Tsinghua University in China, where I received interdisciplinary training in electrical engineering, computer science, and artificial intelligence.

WHAT IS YOUR AREA OF RESEARCH?

My research focuses on optimizing large-scale biophysical brain circuit models. Specifically, I develop methods to accelerate the parameter estimation process, which is often computationally expensive due to the need for repeated numerical integration of differential equations. By improving the efficiency of this process, I aim to make biophysical models more scalable and applicable to a wider range of neuroscientific and cognitive studies.

WHY IS THIS WORK IMPORTANT?

Biophysical modeling provides a mechanistic framework to understand how neural circuits give rise to brain function and behavior. However, the optimization of such models is typically extremely time-consuming. Our work substantially accelerates this process using advanced AI-based optimization, making it feasible to apply biophysical models to larger datasets and more complex questions. This can ultimately help bridge the gap between biological understanding and computational modeling of the brain.

WHAT INSPIRED YOU TO CHOOSE THIS FIELD OF STUDY?

I have always been fascinated by how the human brain works—partly out of curiosity, and partly because I believe understanding brain mechanisms is essential for advancing artificial intelligence. During my studies, I found that biophysical modeling offers a unique way in this area. However, one major challenge is the slow optimization process. Given my background in deep learning, I was motivated to tackle this challenge by developing AI-based methods to accelerate biophysical model optimization.

WHY DID YOU CHOOSE TO DO YOUR RESEARCH HERE?

Our group has strong expertise in both computational neuroscience and machine learning, which aligns perfectly with my research interests. Moreover, my supervisor and colleagues are deeply dedicated and highly experienced in the field. They have provided me with invaluable guidance and inspiration in developing rigorous and impactful research.

WHAT ARE THE LONG-TERM GOALS OF YOUR RESEARCH?

My long-term goal is to deepen our understanding of the brain's computational principles and use this knowledge to inspire the next generation of AI systems. Ultimately, I hope to build models that can better capture the adaptive and cognitive aspects of real brain dynamics.

WHAT ARE SOME OF THE BEST EXPERIENCES THAT YOU HAVE HAD IN THE LAB?

I really enjoy the collaborative atmosphere in our lab. Discussing ideas with lab members and exchanging feedback has always been enlightening. I also appreciate our weekly "brain tea" sessions every Friday afternoon, where we relax with snacks and games. Other informal gatherings and occasional social activities also help build a strong sense of community and teamwork..

WHAT ARE SOME HOBBIES THAT YOU DO IN YOUR SPARE TIME?

I enjoy sports. I have played table tennis since childhood and still play regularly. I also enjoy swimming. Beyond sports, I love reading, especially fantasy novels. And I often watch football and basketball games to relax.

Torance is a student in the NUS Medicine Graduate Programme, and under the guidance of Asst. Prof. June Lo at the Sleep and Health Laboratory.

TORANCE TAN — MEDICAL STUDENT

COULD YOU BRIEFLY DESCRIBE YOUR BACKGROUND?

I am in the midst of my MBBS program here in NUS YLLSOM. My interest in Sleep and its effects on health began when I first discovered and worked with Prof June and Tiffany in JC as part of the Science Research Program organized by NUS. Ever since then, I've been fortunate enough to continue on in SHL gaining invaluable research experience and skills that I hope could translate to the clinical setting.

WHAT IS YOUR AREA OF RESEARCH?

I am interested in how sleep affects our body's various metabolic processes and as such its broader implications on health; more importantly its role in the development of the 3 highs (diabetes, hypertension and hyperlipidemia). Therefore, the key focus of my collaboration was how different short sleep patterns affects glucose metabolism and its broader implications on the development of type 2 diabetes mellitus.

WHY IS THIS WORK IMPORTANT?

Amidst the Healthier SG push moving healthcare into the community with the principle of "prevention is better than cure", lifestyle's role in preventing chronic diseases becomes increasingly important. Besides the common lifestyle prescriptive factors of diet and exercise, sleep is often overlooked especially in sleep deprived Singapore. Therefore, as lifestlye factors and changes take the forefront in this next chapter of Singapore's healthcare, I hope local data can increase the spotlight on Sleep's importance in preventing chronic disease development and progression.

WHAT INSPIRED YOU TO CHOOSE THIS FIELD OF STUDY?

With Singapore being the most sleep deprived country in the world, I hope to utilise my interest in Sleep research to make a positive impact to the development of relevant lifestlye changes the layperson can make to increase their healthspan.

WHY DID YOU CHOOSE TO DO YOUR RESEARCH HERE?

I first got introduced to the world of scientific academia, specifically sleep science, when I interned under Prof June and Tiffany in JC as part of the Science Research Programme (SRP). Therefore, seeking to deepen my research and statistical analysis skills in Medical School, I felt it was only natural to continue on in SHL.

WHAT ARE THE LONG-TERM GOALS OF YOUR RESEARCH?

To better objectively understand sleep's role in disease prevention and health promotion.

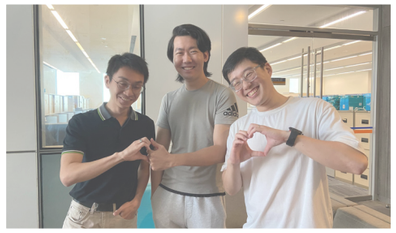
WHAT ARE SOME OF THE BEST EXPERIENCES THAT YOU HAVE HAD IN THE LAB?

Making manuscript revisions with Prof June's baby daughter's support.

WHAT ARE SOME HOBBIES THAT YOU DO IN YOUR SPARE TIME?

Checking out new café spots with my girlfriend and going to the gym after so we can check out new café spots.



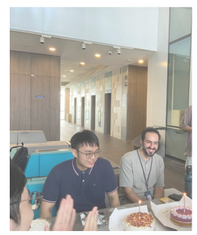








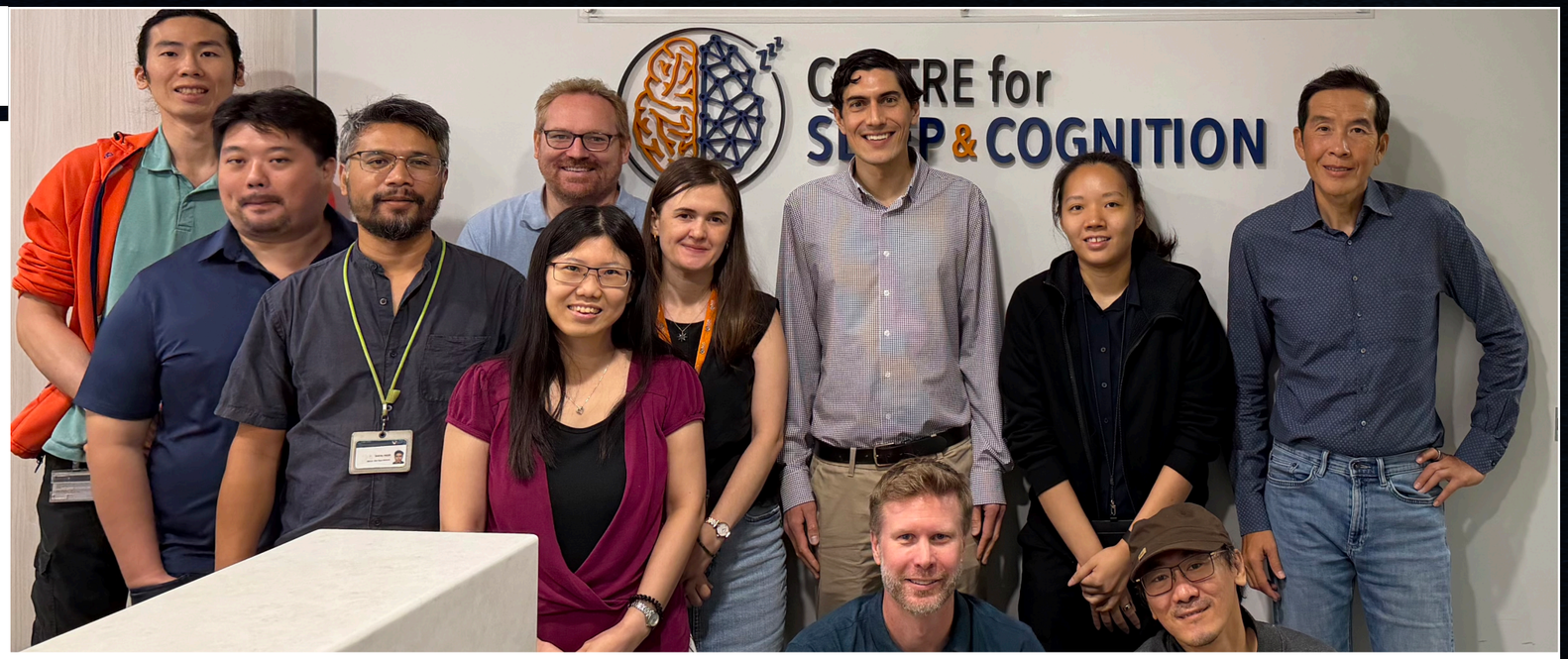





ENTREPRENEURIAL ACTIVITIES

NUS · ŌURA
JOINT LABORATORY

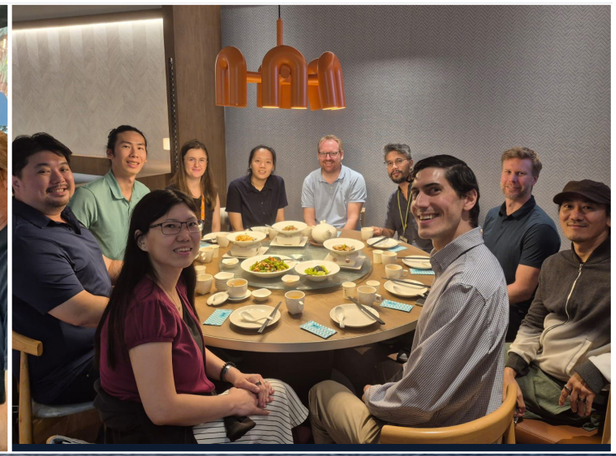
ŌURA and the National University of Singapore expand partnership with joint lab focused on personalizing preventive health



ŌURA, maker of the most trusted smart ring, Oura Ring, and the Centre for Sleep and Cognition at Yong Loo Lin School of Medicine, National University of Singapore (CSC-NUS), formed a joint laboratory in October 2025. Marking a significant milestone as ŌURA's first research entity in the APAC region, the joint laboratory will offer opportunity to further research around diverse aspects of human health and wellness—including sleep, physical activity, cardiovascular, metabolic, mental and women's health.

Over the past six years, ŌURA and CSC-NUS have partnered on multiple projects, including evaluating the accuracy of ŌURA's sleep tracking and understanding how day-to-day shifts in wearable biometric data collected over months to years inform about cardiovascular health.

Setting up this entity fulfiled a long held desire to partner with a reputable company to advance the lab's mission to translate its scientific work in society in a sustainable manner. The lab will work to boost personal and population health by pairing Oura's trustworthy and continually advancing biometric data gathering with NUS' decades-long expertise in sleep science, physiological data analysis and insights into modifying health behaviour.



Changing health habits is notoriously difficult, but it is the prize the Joint Lab is determined to win. We envisage this being realized through integration of personal and population health information with continuously accruing biometric data. We expect such data to grow in volume, sophistication and relevance. While sleep remains the flagship health behaviour studied, the lab is also working to combat reduced physical activity and increased sedentariness, which together, erode population health. The lab's output will benefit cardiovascular, metabolic, mental and women's health and further efforts to optimize human physical and cognitive assets.

These efforts align with Singapore's desire to lead in the application of technology to pragmatic ends. Better health encompasses a state of physical, mental and social wellbeing beyond just absence of disease. This is in complete alignment with Oura's vision to advance preventive health while benefiting human performance and wellbeing.

The Oura-NUS Joint Lab will be jointly advised by Dr. Shyamal Patel, Senior Vice-President of Science at Oura, and Professor Michael Chee, Director for the Centre for Sleep and Cognition at NUS.

This Joint Lab will accelerate the realization of our common dream of reducing the burden of chronic disease through the provision of relevant and timely feedback about how to optimize multiple lifestyle choices on an ongoing basis, to achieve that goal.

ENTREPRENEURIAL ACTIVITIES

Multimodal Neuroimaging in Neuropsychiatric Disorders Laboratory (MNNDL)
drives research translation through entrepreneurial programmes, including the National Graduate Research Innovation Programme (GRIP) and NHIC Innovation to Develop (I2D), advancing multimodal neuroimaging technologies toward real-world clinical and commercial deployment.

National GRIP
Graduate Research Innovation Programme

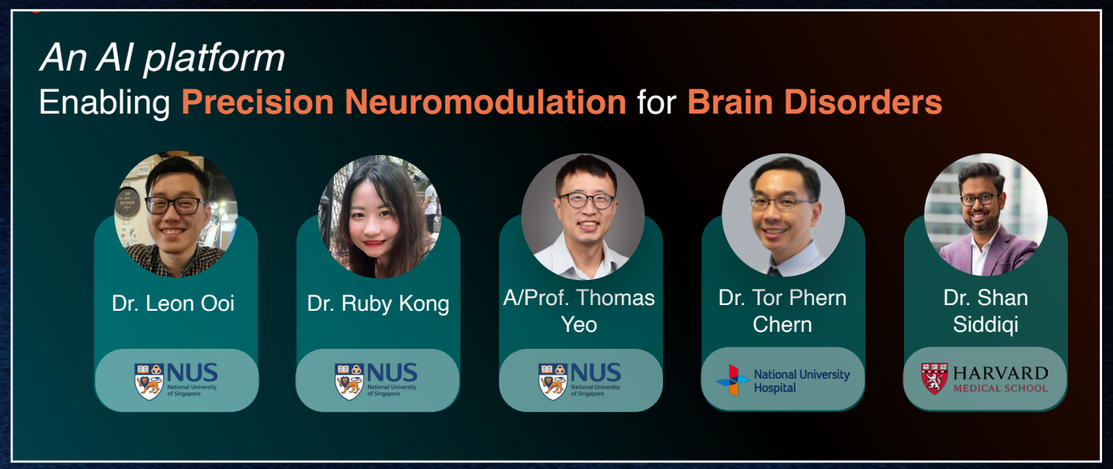
The National Graduate Research Innovation Programme (GRIP) transforms cutting-edge research into market-ready deep tech startups by connecting graduate researchers with experienced entrepreneurs, investors, and industry partners. We proposed our multimodal brain health screening software aimed at early detection of cognitive decline using clinical imaging in National GRIP Run 3. We are pleased to have been admitted for the coming year, where we will refine our technology, strengthen our commercialization strategy, and engage with local healthcare providers and insurers to accelerate real-world adoption and societal impact.

NHIC
National Health Innovation Centre

We also applied for the NHIC Innovation to Develop (I2D) grant to support the translation of our multimodal brain age models into a clinically deployable brain health screening solution. Although the application was rejected, the review process provided valuable and constructive feedback, particularly highlighting the importance of stronger alignment with real-world clinical and market needs. This experience helped us clarify our value proposition, refine our target users, and better articulate the economic and operational benefits for healthcare providers and payers. The insights gained have strengthened our commercialization strategy and will directly inform future innovation grant and industry partnership applications.

Computational Brain Imaging Group (CBIG)
advances entrepreneurial translation through the NUS spinoff B1neuro, to deliver precision neuromodulation treatments for psychiatric and neurological disorders, with clinical rollout planned at NUH.

B1neuro



Dr. Leon Ooi and Dr. Ruby Kong founded an NUS spinoff B1neuro to provide precision neuromodulation treatments for psychiatric and neurological conditions. A/Prof. Thomas Yeo, Dr. Phern-Chern Tor (NUH) and Dr. Shan Siddiqi (Harvard Medical School) serve as advisors to the spinoff. We hope to roll out clinical service at National University Hospital in early 2026.

PARTNERSHIPS

Our Centre has established strong collaborations with a wide range of academic and industry partners. These partnerships have been instrumental in enhancing the reach and impact of our initiatives and in expanding the breadth of our research activities.

SG70

SG70 is a large-scale prospective longitudinal project examining multidimensional ageing outcomes in 1500 Singaporean older adults, led by Prof. Koh Woon Puay. This year, Prof. Michael Chee's team published the very first manuscript from SG70, examining the association between multidimensional sleep and cognition. In a subset of SG70 participants with 8-night PSG data from the Dreem band, slow-wave activity relative power was the most stable deep-sleep metric and showed stronger cognitive associations than stage N3.

Further, Prof. Chee's team is currently examining how profiles of sleep patterns may map onto cardiovascular risk. In addition, A/Prof. Helen Zhou's team has collected ~1000 MRI scans from SG70 participants, which will enable further collaboration among the CSC teams to understand the complex interplay among sleep, brain, and cognition in ageing.

OURA HEALTH / OURA RING

Over the past six years, SCL and Oura have partnered on multiple projects ranging from evaluations of sleep tracking performance in Oura's rings, to understanding how day-to-day shifts in wearable biometric data collected over months to years inform about cardiovascular health.

Starting from October 2025, SCL and Oura have further expanded their partnership with a joint lab focused on personalizing preventive health. This initiative seeks to pair Oura's trustworthy and relevant biometric data gathering capacity with SCL's decades-long expertise in sleep science, physiological data analysis and insights into modifying health behavior, for greater translational impact.

GLOW (GLOBAL WOMEN'S HEALTH)

MNNDL is collaborating with GLOW, NUS Medicine on two projects. The first project, led by Prof. Zhang Cuilin and her team, seeks to investigate the effects of an Asia-Mediterranean diet on brain and cardiometabolic health in Chinese women at reproductive age who are overweight or obese. To date, close to 50% of the baseline scans have been collected among which one third of the participants has progressed to Week 20 in the timeline for their second scans.

The second project, led by Asst Prof. Li Lingjun, aims to study the intergenerational health impacts of gestational diabetes mellitus in Singapore pregnant women and their offspring by characterizing changes in glycemic, brain, cardiometabolic, liver fat and function profiles from start of pregnancy to one year postpartum. Two thirds of the MRI scans have been collected.

PROJECT HEATS

Project HEATS (Heat Exposure, AcTivity, and Sleep) is a three-year, multi-institutional project that focuses on improving sleep for individuals living in a hot climate via developing technological and behavioural solutions. The project team is comprised of researchers from the University of California, Berkeley, the National University of Singapore, and The University of Sydney. To date, we are halfway through data collection for our studies, and expect to complete them by mid-2026.

QUANTACTIONS

QuantActions is a valued research partner whose innovative digital neuroscience tools have played an essential role in many of our projects. The Swiss company, a spin-off from the University of Zurich, specializes in cognitive assessment through daily smartphone interactions captured via their TapCounter and BrainAware apps. These objective, real-world measures have been integral to our investigations into how smartphone behaviours relate to sleep, mood, and peri-sleep routines (such as bedtime procrastination).

By combining QuantActions' high-resolution behavioural data with wearable-derived sleep metrics and participant self-reports, we have gained deeper insights into the connections between digital habits and our participants' wellbeing.

The passive nature of their applications further enabled their use in a year-long study exploring the physical and mental wellbeing challenges faced by our university staff, highlighting the value of QuantActions' tools in supporting comprehensive, real-world research.

HPB

SCL has been partnering with HPB (Health Promotion Board) since 2019, through its "Health Insights Singapore (hiSG)" population health study that seeks to better understand the health behaviours of Singapore residents using wearable technology. SCL has previously published findings looking at the effects of COVID-19 restrictions on sleep and physical activity patterns in 21-40yo working adults as well as results of an intervention study for short sleepers in the same cohort.

This year, we published findings examining how COVID-19 restrictions differentially impacted rest-activity rhythms in the younger 21-40y vs. older adult 51-70y cohort. We showed that younger adults were more affected by these restrictions, with larger decreases in rhythm stability and magnitude of daily activity observed. These larger declines in rhythm stability were also associated with poorer mental wellbeing 15 months post-lockdown, in younger but not older adults.

Work is currently underway to examine relationships between sleep and physical activity in these two HPB cohorts.

SINGER

Partnering with the Memory, Ageing, and Cognition Centre of NUHS (led by A/Prof. Christopher Chen), our CSC faculty (comprising A/Prof. Helen Zhou and A/Prof. Thomas Yeo) is at the forefront of evaluating whether a multidomain lifestyle intervention, involving dietary advice, exercise, cognitive training, and vascular risk factors management, is effective in reducing cognitive decline and physical frailty in older adults with increased risk of dementia.

This study, the SINgapore GERiatric intervention study (SINGER), is part of the worldwide FINGERS initiative. Leveraging on high-resolution Magnetic Resonance Imaging, the CSC team endeavors to answer questions that may be unique to Singaporean/Asian phenotypes with regard to vascular cognitive impairment. The study aspires to establish a foundation for robust and explainable personalized preventive medicine. To date, we have successfully collected MRI scans from over 900 participants, of whom more than 600 have completed their follow-up assessments. As the two-year intervention is approaching the end, the project team has further secured an NMRC OF-IRG grant on SINGER long-term follow-up.

US NATIONAL SLEEP RESEARCH RESOURCE

The National Sleep Research Resource (NSRR) is an NHLBI-supported repository for sharing large amounts of sleep data (polysomnography, actigraphy and questionnaire-based) from multiple cohorts, clinical trials, and other data sources. Launched in April 2014, the mission of the NSRR is to advance sleep and circadian science by supporting secondary data analysis, algorithmic development, and signal processing through the sharing of high-quality data sets.

Dr. Ju Lynn Ong organized the upload of 183GB of EEG data from the Need For Sleep series of studies into the NSRR. Additionally, a video summarizing the series of studies was also posted on the NSSR YouTube Channel.

NSSR video summary of the series of studies: Link

PROJECT RESET

Project RESET is a nationwide preventive heart health research initiative spearheaded by Prof. Roger Foo, Director of the Cardiovascular-Metabolic Disease Translational Research Programme (CVMD TRP) at the Yong Loo Lin School of Medicine, and funded by the National Research Foundation, Singapore and the Ministry of Health's National Medical Research Council. RESET seeks to recruit 3,000 participants ages 40 to 70 to map heart disease progression and develop innovative solutions that empower individuals to take proactive steps in their heart health journey.

Prof. Michael Chee and A/Prof. Helen Zhou's team are collaborating with Prof. Roger Foo and his team from the Cardiovascular-Metabolic Disease Translational Research Programme at NUS School of Medicine to perform neuroimaging, neuropsychological assessments and digital tracking on participants of the Project RESET study. This year, SCL partnered with Oura to additionally collect data in a subset of this valuable cohort. By integrating Oura's cutting-edge wearable technology with cardiovascular metrics and outcomes from Project RESET, this partnership will enable the use of real-world health data to create AI-driven insights for the early detection of cardiovascular disease and development of personalised interventions. Additionally, MNNDL is leading the RESET Brain Study, aiming to examine the brain health and brain-heart connection in persons at high-risk for cardiovascular disorder.

ACROSS

ACROSS is a pan-Asian collaborative study initiated by the Asian Society of Sleep Medicine (ASSM), aimed at mapping out regional difference in adolescent sleep patterns and barriers to sleep as they relate to geographical, cultural, and societal differences in the region. Together with colleagues from the Chinese University of Hong Kong, SCL is leading the coordination of this project involving collaborators across more than 10 countries in Asia.

The ACROSS study kicked off this year with major milestones: collaborative survey construction (August 2025), symposium presentation at the ASSM meeting (Sept ember 2025), and collaborative meetings with the participating centres (in-person: September 2025; online: October 2025).

CONNEXIONS

Asst. Prof. June Lo is partnering with Connexions Integrated Learning Hub to investigate the impact of behavioural factors (e.g. smartphone usage) and bedroom environmental factors (e.g. temperature, noise, and light) on sleep disturbance in adults with autism spectrum disorder. The influence of sleep disturbance on emotional and behavioural difficulties is also going to be examined.

PROJECT LIFESPAN

MNNDL is currently conducting the SG Lifespan Study to investigate the brain activation and connectivity that underlies perception and cognition across the lifespan (i.e. different age cohorts). Multimodal data which includes brain neuroimaging, physiological and psychological characteristics, cognitive and behavioural assessments, blood biomarkers, and digital tracking, e.g. Oura sleep and activity tracking, tap frequency, were collected for this study. To date, three cohorts of healthy participants have been recruited for the study – 1) young-age participants (21 – 30 years old) from the community, 2) middle-aged participants (40 - 80 years old) from the community and 3) NUS staff who were referred from the NUS1000 Staff Edition study by Sleep and Cognition Lab.

KK WOMEN'S AND CHILDREN'S HOSPITAL

In 2023, SCL partnered with KKH to collect Oura ring data from the Healthy Early Life Moments in Singapore (HELMS) cohort. This study looks into lifestyle interventions to improve mental and metabolic health in women trying to conceive and specifically targets obese and overweight women who have lowered fertility and are at a higher risk of poorer pregnancy, and post-partum outcomes. To-date, analyses are underway looking at Baseline and 3-month outcomes.

Asst. Prof. June Lo and her PhD student, Chong Hwee Min, are collaborating with KKH in a study to develop and test a six-session parent-led intervention that integrates sleep strategies and anxiety management techniques to improve sleep and emotional well-being in preschoolers. It involves focus groups for cultural adaptation and a randomized controlled trial with parent-child dyads to evaluate the program's effectiveness in improving child's sleep and emotional well-being and reducing parental stress.

NEW INTERNATIONAL COLLABORATORS

Dr. Hui Zhang
UC Berkeley

A/Prof. Alison Adcock
Duke University

Prof. Scott Huettel
Duke University

Asst. Prof. Alyssa Sinclair
Rice University

Asst. Prof. Rachel Chan
Chinese University of Hong Kong

Prof. Christopher Barnes
Foster School of Business

Prof. Stefano Schiavon
UC Berkeley

Dr. Thomas Parkinson
University of Sydney

EXISTING COLLABORATORS

Prof. Thomas Penzel
Charite - Universitatsmedizin Berlin

A/Prof. JP Onnela
Harvard T.H. Chan School of Public Health

A/Prof. Bei Bei
Monash University

Prof. Yanjie Su
Peking University

A/Prof. Aly Suh
Sungshin Women's University

Asst. Prof. Arko Ghosh
Leiden University

Prof. Thanh Dang Vu
Concordia University

Dr. Anthony Reffi
Michigan State University

Dr. Raphael Vallat
Oura Health Oy

Dr. Olivia Walch
Arcascope

EXTERNAL FUNDING

Our work at the Centre is supported by the invaluable contributions of various funding bodies and companies. Their unwavering commitment and financial backing have been the cornerstone of our ability to conduct cutting-edge research and make meaningful strides in our respective fields.

Prof. Michael Chee

Oura Health Oy
OURA-NUS Collaboration on Cardiovascular Health

Oura Pte. Ltd
Establishment of the Oura-NUS Joint Laboratory

A/Prof. Helen Zhou

National Medical Research Council (OF-YIRG)
Investigating Heart-Brain-Cognition Relationships and the Effects of Lifestyle Modifications in Hypertensive Heart Disease

National Medical Research Council (OF-IRG)
SINGER Study (Follow-up)

DSO National Laboratories
Brain Decoding & Brain-Heart Studies

NUHS Clinician Scientist Programme (NCSP 3.0)
Augmentation of Glymphatic Pathways via Lymphovenous Bypassess in the Cervical Region

A/Prof. Thomas Yeo

National Research Foundation Investigatorship
Precision Psychiatry

National Medical Research Council [OF-YIRG]
High-Resolution Spectral Normative Modeling

National Health Innovation Centre [I2Start]

National Institute of Health [RO1]

Asst. Prof. June Lo

National Research Foundation
Project HEATS: Heat Exposure, AcTivity, and Sleep

SCIENTIFIC IMPACT

We have maintained a steady clip of ~40 high impact publications annually across the tenured faculty over the last 4 years and an average of ~76% of these in the top 10% of scientific journals. All 4 tenured faculty are in the top 2% cited authors, with Thomas Yeo being in the top 0.01% for multiple consecutive years.

Our participation in major scientific meetings has grown and we had a record 33 poster presentations, 14 oral presentations, 15 symposia organised, 9 courses delivered, 24 invited talks and 5 keynote addresses. As we continue to grow in eminence in our respective scientific communities, our trainees benefit by forming and growing their own scientific networks. This is an activity that is extremely vital to generating novel scientific ideas and forming new strategic partnerships.

Singapore has established itself as a premier scientific meeting destination and our labs have gained invaluable experience in contributing to the organization of major international scientific meetings like World Sleep 2025.

In addition to our main meetings, our PIs have also invited to present at special events or niche meetings helping us expand our scientific footprint.

Beyond engagements with academic colleagues, PIs and research staff participate in community events that bring our discoveries and insights to the public.

2025 HIGHLIGHTS

CONFERENCES

In 2025, members of our Centre travelled around the globe to share our research and foster collaborations with esteemed scientists around the world. We are delighted to present a glimpse of our remarkable journey through some notable highlights from the conferences we had the privilege to attend.

47
PRESENTATIONS

15
SYMPOSIA

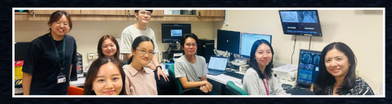
9
COURSES

24
TALKS

5
KEYNOTES

ASSM
Asian Society of Sleep Medicine

- **Dr. Stijn Massar (research assistant professor, SCL)** delivered a keynote address titled 'One Million and one Nights: harnessing the power of wearables to accelerate population health'
- **Dr. Stijn Massar (research assistant professor, SCL)** gave a symposium talk on Cross-cultural differences in sleep patterns and problems in Asian school-aged adolescents — the ACROSS study
- **Dr. Soon Chuan Siong (research fellow, SCL)** presented on Z4IP and its Comprehensive Sleep and Activity Phenotyping Through Multifactor Mobile Data Integration and Structural Factors Impeding or Facilitating Freshmen Sleep Habits
- **Prof. June Lo (PI, SHL)** gave a symposium talk on Neurobehavioral functions in sleep-restricted adolescents



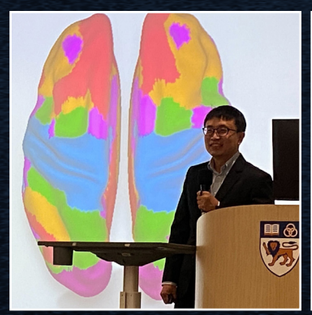
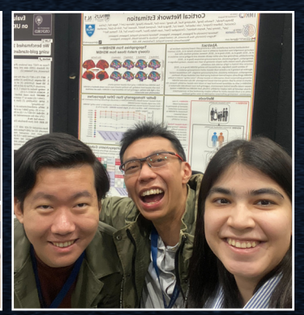
BRISBANE
OHBM 2025 JUNE 24-28

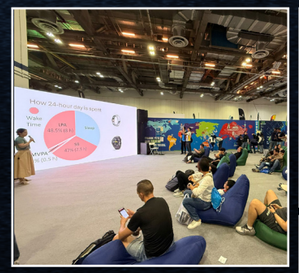
- **Dr. Ju Lynn Ong (research assistant professor, SCL)** gave a symposium talk on Unravelling the adolescent brain: the role of sleep in brain maturation and cognitive development
- **A/Prof. Helen Zhou (PI, MNNDL)** chaired a symposium talk on Machine Learning for Brain Imaging: Predicting Traits, Disease Progression, and Treatment Response
- **Dr. Zhang Yichi (senior research fellow, MNNDL)**, part of the open science special interest group, gave a satellite talk on Good Practices in AI-based Neuroimaging Studies: An example in Brain Age Prediction
- **Dr. Chen Zijiao (research fellow, MNNDL)** gave a symposium talk on AI for Open Neuroimaging: Opportunities and Challenges from an Open Science Perspective
- **Dehestanikolagar Niousha (research fellow, MNNDL)** gave a symposium talk on Longitudinal Insights into Adolescent Mental Health: Integrating Neurobiological and Lifestyle Biomarkers to Indentify Emotion Dysregulation and Depression Profiles

- **Nguyen Thuan Tinh (Sophia) (research fellow, MNNDL)** gave a talk on Predicting Mental Health & Mortality: Insights from Functional Connectivity & Cross-Dataset Validation and attained the *Merit Award*
- **Dong Zijian (PhD candidate, MNNDL)** gave a symposium talk on Brain Dynamics Foundation Model—a breakthrough AI approach for predicting traits, disease progression, and treatment responses
- **Dr. Sina Mansour L (research fellow, CBIG)** presented on Spectral Normative Modeling (SNM) for High-resolution Brain Abnormality Inference and attained the *Merit Abstract Award*
- **Dr. Sina Mansour L (research fellow, CBIG)** gave a course on From Code to Visualization: Reproducible Pipelines for Neuroimaging Research
- **Dr. Sina Mansour L (research fellow, CBIG)** delivered an invited talk titled 'Neuroimaging Data Visualization with Python'
- **Dr. Natasha Louise Taylor (research fellow, DBM)**, the lead social coordinator of the Student & Postdoc Special Interest Group, gave a symposium talk at the NeuroSalience Podcast

CONFERENCES

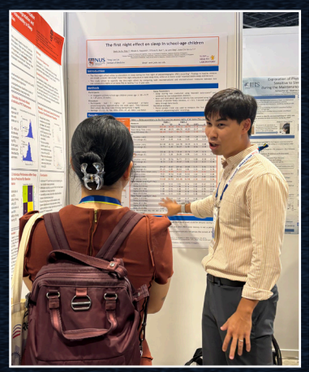
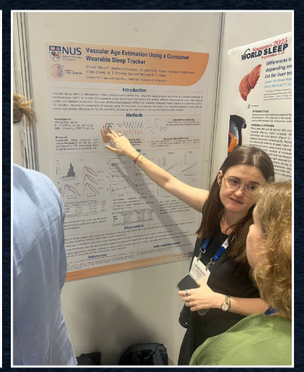
- **A/Prof. Helen Zhou (PI, MNNDL)** delivered a keynote address titled 'Integrating Brain Imaging and AI: Applications in Neurological Disorders and Healthy Longevity' at the Talk with a coffee chat session, NUS EMBA-C program **(Singapore)**
- **A/Prof. Helen Zhou (PI, MNNDL)** delivered a keynote address titled 'NeuroDA: NeuroImage Data Analytics – Challenges, Developments, and Opportunities' at the 2025 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP) **(Hyderabad, India)**
- **A/Prof. Helen Zhou (PI, MNNDL)** delivered a keynote address titled 'Brain Foundation Models' at the 2025 Asia-Pacific Computational and Cognitive Neuroscience Conference **(RIKEN, Japan)**
- **A/Prof. Helen Zhou (PI, MNNDL)** delivered a keynote address titled 'Integrating Brain Imaging and AI: Applications in Neurological Disorders' at the 9th BigBrain Workshop-HIBALL Closing Symposium **(Berlin, Germany)**
- **A/Prof. Helen Zhou (PI, MNNDL)** delivered an invited talk at the NUHS Grand Round **(Singapore)**
- **A/Prof. Helen Zhou (PI, MNNDL)** delivered an invited talk and joined the panel discussion at the KCL Annual Neuroscience Conference Trivergence **(London, UK)**
- **A/Prof. Helen Zhou (PI, MNNDL)** delivered an invited talk titled 'Brain Dynamics Foundation Model for Vision Decoding and Disease Prediction' at the 7th Chinese Computational and Cognitive Neuroscience Conference **(Xi'an, China)**
- **A/Prof. Helen Zhou (PI, MNNDL)** delivered an invited talk at the 2025 West China International Forum for Schizophrenia Research **(Chengdu, China)**




- **A/Prof. Helen Zhou (PI, MNNDL)** delivered an invited talk titled 'Building Productive Collaborations: Driving Discovery as One Team' at Where Medicine Meets Machine: Building Bridges Across Disciplines **(Singapore)**
- **A/Prof. Helen Zhou (PI, MNNDL)** delivered an invited talk titled 'Integrating Brain Imaging and AI: Applications in Neurological Disorders' at the International Joint Medical Symposium SJTUSM-UOM-CLARA-NUSMED **(Shanghai, China)**
- **A/Prof. Helen Zhou (PI, MNNDL)** delivered an invited talk titled 'Brain imaging, AI, and ageing' at the International Conference for Healthy Ageing and Mental Wellbeing **(Taipei, Taiwan)**
- **A/Prof. Helen Zhou (PI, MNNDL)** delivered an invited talk titled 'Understanding Brain Health with AI' on the Times Higher Education Connect podcast **(link)**
- **A/Prof. Helen Zhou (PI, MNNDL)** gave a course on 'fMRI in the Era of Machine Learning: Dynamic Brain Decoding' at the Annual meeting of ISMRM & ISMRT **(Hawaii, USA)**

- **Dong Zijian (PhD candidate, MNNDL)** gave a symposium talk on Brain-JEPA: Brain Dynamics Foundation Model with Gradient Positioning and Spatiotemporal Masking at the at the 2025 Asia-Pacific Computational and Cognitive Neuroscience Conference **(RIKEN, Japan)**
- **Dr. Zhang Yichi (senior research fellow, MNNDL)** delivered an invited talk titled 'How Do We Decode the Brain' at the Jurong Regional Library, National Library Board **(Singapore)**
- **Dr. Eric Ng (senior research fellow, MNNDL)** delivered an invited talk titled 'A brain teaser for healthy ageing' at the Standard Chartered Marathon Singapore 2025 Race Pack Collection Exhibition: Health Talk for Project RESET **(Singapore)**
- **A/Prof. Thomas Yeo (PI, CBIG)** gave a Tham Cheok Fai memorial lecture on cutting edge developments in brain imaging and how individual-level network mapping can potentially guide presurgical planning and invasive neuromodulation to the Singapore Chapter of Neurosurgeons **(Singapore)**
- **Dr. Ruby Kong (research fellow, CBIG)** delivered an invited talk titled 'Individual-specific brain parcellations for brain stimulation' at the CNDS, CBIS, and brainSTIM Neuromodulation and Neuroimaging Relevant to Affective Disorders Speaker Series **(Pennsylvania, USA)**
- **Dr. Ruby Kong (research fellow, CBIG)** delivered a virtual invited talk titled 'Individual-specific brain parcellations for brain stimulation' at the Translational Neuroimaging Educational Program
- **Dr. Ruby Kong (research fellow, CBIG)** delivered an invited talk titled 'Individual-specific brain parcellations for brain stimulation' at the Dartmouth Center for Cognitive Neuroscience (CCN) workshop **(New Hampshire, USA)**

- **Dr. Ruby Kong (research fellow, CBIG)** delivered an invited talk titled 'Individual-specific brain parcellations for brain stimulation' at the Harvard Medical School as a guest lecturer **(Massachusetts, USA)**
- **Dr. Ruby Kong (research fellow, CBIG)** delivered an invited talk titled 'Individual-specific brain parcellations for brain stimulation' at the Hong Kong Polytechnic University UBSN Research Seminars **(Hong Kong, China)**
- **Ooi Qi Rong, Leon (research fellow, CBIG)** delivered an invited talk titled 'Optimizing brain wide association studies: accuracy, reliability, sample size and scan duration' at the Hong Kong Polytechnic University UBSN Research Seminars **(Hong Kong, China)**
- **Ooi Qi Rong, Leon (research fellow, CBIG)** delivered an inivited talk titled 'AI-enable precision treatment for depression' at the NUSRI Suzhou InnovFest **(Suzhou, China)**
- **Ooi Qi Rong, Leon (research fellow, CBIG)** delivered an inivited talk titled 'Personalized TMS for Treatment Resistant Depression' at the Singapore Health and Biomedical Congress **(Singapore)**
- **Dr. Sina Mansour L (research fellow, CBIG)** gave an invited talk titled 'Charting Multi-Scale Brain Phenotypes Using Spectral Normative Models' at the ISMRM Workshop on 40 Years of Diffusion **(Kyoto, Japan)**
- **Tianchu Zeng (PhD student, CBIG)** delivered a invited talk titled 'Optimizing biophysical large-scale brain circuit models' at the Asia-Pacific Computational and Cognitive Neuroscience Conference (APCCN25) **(RIKEN, Japan)**
- **Dr. Poh Jia-Hou (PI, DBML)** was invited as a topic expert on "Curiosity Reimagined in the Gen AI Age" at the MOE Research Pre-Forum Roundtable **(Singapore)**

WORLD SLEEP CONGRESS

The World Sleep congress convenes sleep health professionals from over 80 countries for scientific presentations, courses, and networking. With over 350 hours of in-person presentations scheduled, World Sleep presents a comprehensive scientific program that encompasses the interdisciplinary nature of sleep science.

COURSES

Prof. Michael Chee (PI, SCL)
gave a Year in Review Course on Sleep, Sleep Loss and Cognition and gave 2 other courses on Sleep and Cognitive Function in Adolescents and Beyond Sleep: Leveraging other health applications of wearable trackers

Dr. Ju Lynn Ong
(research assistant professor, SCL)
gave 2 courses on Big data, bigger impact: Transforming sleep research with AI and Interpretation of performance evaluation studies and how to select a device that suits your needs

Dr. Shuo Qin
(research fellow, SCL)
gave a course on Association between sleep and cognition in older adults

SYMPOSIA

Prof. Michael Chee (PI, SCL)
gave a symposium talk on the introduction and rationale of WSS Task Force recommendations for use of consumer health trackers for sleep tracking

Dr. Adrian Willoughby
(senior research fellow, SCL)
gave a symposium talk on the introduction to Tales from the edge: What can we learn about sleep from non-WEIRD (Western, Educated, Industrialized, Rich, and Democratic) sleep research? tracking

Dr. Ruth Leong (research fellow, SCL) & Dr. Ju Lynn Ong (research assistant professor, SCL)
gave a symposium talk on Napping and its associations with health and cognition across the life span tracking

Prof. June Lo Chi Yan (PI, SHL)
chaired a symposium talk on The rhythm of rest: Exploring the cognitive and psychological benefits and drawbacks associated with intraindividual variability in sleep

Dr. Stijn Massar
(research assistant professor, SCL)
chaired a symposium talk on Sleep deprivation, motivation, and effort investment

Dr. Shuo Qin
(research fellow, SCL)
gave a symposium talk on Associations of sleep variability with mental health and cognition in working and older adults

SOCIETAL OUTREACH

Communicating our work to the public both within Singapore and internationally has grown in volume and significance in 2025. Press releases and public commentaries used to be the main channel of such activities, but Centre PI's and Research Staff are now increasingly engaged in maintaining and active social media presence to keep others aware of our contributions and those of our allies.

We participate in podcasts, radio and television interviews both at home and in with international media or scientific outlets.

Should you sleep on the plane or stay awake - and 7 other questions

Dr. Adrian Willoughby was featured in a CNA article, discussing jetlag and travel-related sleep disruptions.

CNA News Article

Brain Connectome Phenotype Linked to Cerebrovascular Disease Can Track Cognitive Decline

A/Prof. Helen Zhou and Dr. Joanna Chong's were featured in NUS Medicine School's news for their work.

NUS Medicine Article

Many in Singapore struggle to get good night's sleep

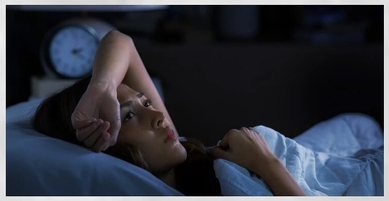
Prof. Michael Chee and Asst. Prof. June Lo were featured in CNA, discussing the importance of sleep and the struggles faced in Singapore to get good nights' sleep.

CNA News Article

国大研究：人们身处不同时区时睡眠时间和结构需更长时间调整

Dr. Adrian Willoughby was interviewed by Channel 8 on jetlag.

Channel 8 Interview



Vulnerability to Stress Magnifies How a Racing Mind Disrupts Sleep

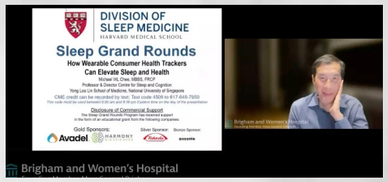
Dr. Noof Shaif's study on Sleep Reactivity was featured in Psy Post.

Psy Post Article

Brain-JEPA and Mind-Video

MNNDL's work on Brain-JEPA and Mind-Video - has been featured in CNA news.

CNA News Article



How Wearable Consumer Health Trackers Can Elevate Sleep and Health

Prof. Michael Chee gave a talk on 'How Wearable Consumer Health Trackers Can Elevate Sleep and Health' on Harvard Medical School's Sleep Grand Ward Rounds.

Harvard Medical School Video

How can we make quality sleep our power move for 2026?

Interview featuring Dr. Stijn Massar in the 'Ask the Expert' column of Her World magazine.

用AI分析大脑活动 国大医学院新技术助更早发现病变

MNNDL's brain foundation model was covered by Lianhe Zaobao.

Clarivate's Highly Cited Researchers 2025

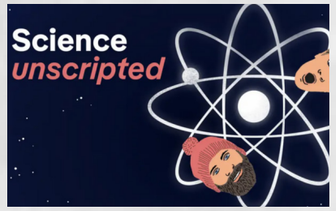
A/Prof. Thomas Yeo is the only scientist in Singapore listed as a Clarivate Highly Cited Researcher under the "Neuroscience and Behavior" category. This is an honor given to 0.01% of scientists worldwide.

Sleep Myths You Should Stop Believing | What Sleep Science Really Says

Dr. Stijn Massar was featured as a guest on the podcast "Night Mode On".

Stanford University-Elsevier: World's Top 2% of Highly-Cited researchers in 2025

Prof. Michael Chee, A/Prof. Thomas Yeo and A/Prof. Helen Zhou and Asst. Prof. June Lo were featured in Stanford University's world's top 2% of highly-cited researchers list, published in October 2025 by Elsevier.



Gen Z Can't Sleep

Dr. Stijn Massar was featured on a radio interview, DW: Science Unscripted.

I Tried Everything To Fix My Sleep In 14 Days - Our Grandfather Story

Dr. Stijn Massar was featured in an episode on Our Grandfather Story YouTube channel.

Understanding Brain Health with AI

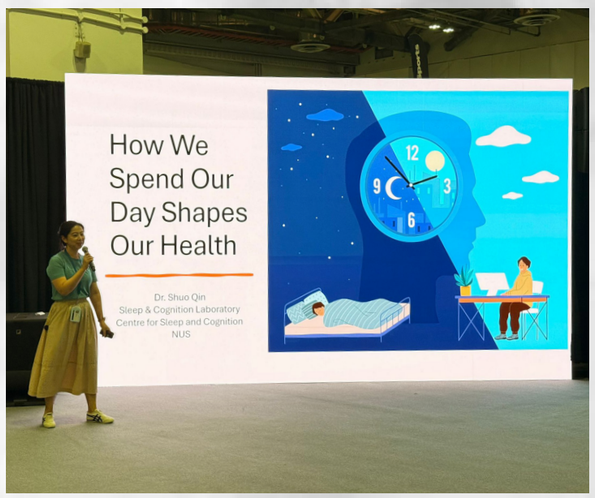
Dr. Helen Zhou was invited for an interview on Times Higher Education Connect podcast.

Face to face engagement in the community has also grown in the last year.

A/PROF. THOMAS YEO AT THE THAM CHEOK FAI MEMORIAL LECTURE

A/Prof. Thomas Yeo gave the Tham Cheok Fai memorial lecture to the Singapore Chapter of Neurosurgeons in October 2025. He shared with local neurosurgeons cutting edge developments in brain imaging and how individual-level network mapping can potentially guide presurgical planning and invasive neuromodulation.

Pictured left: Chairman of the Chapter of Neurosurgeons, Dr. Low Shiong Wen giving a token of appreciation to A/Prof. Thomas Yeo for the Tham Cheok Fai memorial lecture.



TALKS AT STANDARD CHARTERED MARATHON SINGAPORE 2025 EXHIBITION

Dr. Eric Ng and Dr. Eva Qin were invited to give health talks, titled “A Brain Teaser for Healthy Ageing” and “How We Spend Our Day Shapes Our Health” at the Standard Chartered Marathon Singapore 2025 Race Pack Collection Exhibition: Health Talk for Project RESET in December 2025.

SHARING AT QUEENSTOWN HEALTHCARE DISTRICT

Dr. Leon Ooi and Dr. Ruby Kong went down to the Queenstown Healthcare District in June 2025. They shared with Queenstown residents about how brain scans, data analysis, and AI algorithms come together to map brain networks and guide non-invasive treatments such as transcranial magnetic stimulation for depression.

SHARING AT COUNTING SHEEP PROJECT

Asst. Prof. June Lo sharing her expertise on sleep science and its effects across different life stages at Counting Sheep Project.

Z4IP BOOTH AT WORLD SLEEP CONGRESS 2025 IN SINGAPORE

A booth was coordinated for the Z4IP Ecological Momentary Assessment app at World Sleep 2025.

NUS UNIVERSITY HEALTH FAIR

Dr. Stijn Massar & Kyra Chong coordinated a sleep health booth at the University Health Fair in February 2025.

OTHER TALKS

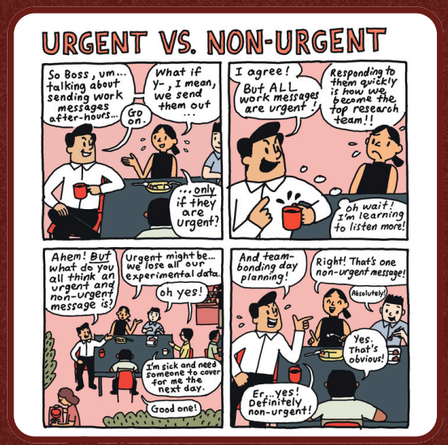
- Prof. Michael Chee shared key insights on adolescent and college sleep with the Sleep Research Society outreach program in October 2025.
- Dr. Stijn Massar gave a public presentation at the Watten Residents’ Network “Unlocking the Power of Sleep” in February 2025
- Dr. Stijn Massar presented for the Singapore Police Force Operations Department “Sleep for Performance” in March 2025

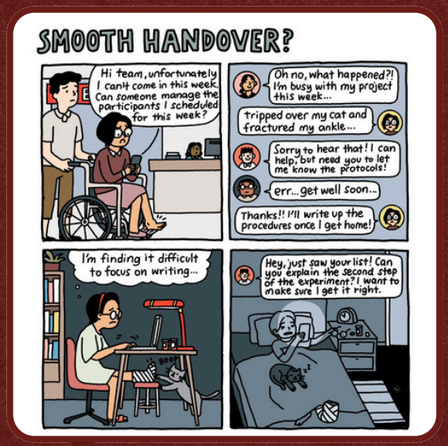
AWARDS AND NOTABLE ACHIEVEMENTS

1. A/Prof. Thomas Yeo’s 2011 atlas of large-scale cortical networks in the human brain has been cited more than 10,000 times.
2. Prof. Michael Chee was elected to the Governing Council of the World Sleep Society.
3. A/Prof. Helen Zhou was selected as an OHBM Fellow.
4. Dr. Stijn Massar was part of the organizing committee for the Asian Society of Sleep Medicine meeting 2025, and joined the Editorial Board of Applied Psychology: Health and Well-being as a Consulting Editor.
5. Dr. Soon Chun Siong received ASSM Young Investigator Awards for his work: ‘Z4IP – Comprehensive Sleep and Activity Phenotyping Through Multifactor Mobile Data Integration’; ‘Structural Factors Impeding or Facilitating Freshmen Sleep Habits’.
6. Dr. Natasha Taylor was elected as lead social coordinator for the Student & Postdoc Special Interest Group OHBM.
7. Dr. Zijiao Chen received Too Joon Chew PhD Prize from NUS Medicine 2025.
8. Dr. Sophia Thuan Tinh Nguyen was awarded a Merit Award by OHBM 2025 in recognition of her research on the functional connectome correlates of psychopathology dimensions.
9. PhD candidate Zijian Dong received a travel grant award from EurIPS (the European site of NeurIPS 2025).

Rest. Refkect. Recharge. Rethink How You Work.

In 2025, the Sleep and Cognition Lab, in collaboration with the Office of Human Resources and the Office of the President, launched a work culture initiative aimed at fostering an environment where staff feel empowered to be creative, energetic, and adaptable amid constant change. Thriving in such a dynamic context requires a healthy rhythm—one that balances sustained periods of focused effort with intentional time for rest, reflection, and renewal.





CSC RETREAT '25

CSC Retreat 2025 convened members of the Centre for Sleep and Cognition for a one-day programme designed to strengthen community ties. With short talks, interactive discussions, and team-building games, the retreat foregrounded Senior Research Fellows' perspectives while encouraging cross-team collaboration and deeper engagement with shared research infrastructure.

TEAM BUILDING

PRESENTERS

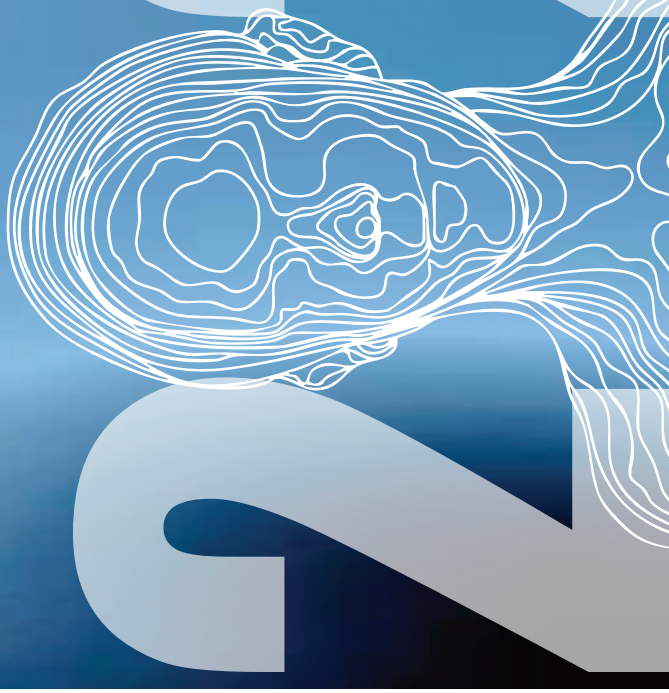
Dr. Adrian Willoughby (senior research fellow, SCL)
presenting on Travel-Related Sleep Disruption

Dr. Joanna Chong (senior research fellow, MNDL)
presenting on Mild Behavioural Impairment Brain Phenotype Relates to Cognitive Decline in Dementia-Free Older Adults

Dr. Sina Mansour L (research fellow, CBIG)
presenting on Lifespan Normative Modeling Charting Healthy Norms & Detecting Pathological Deviations

Tiffany Koa (PhD student, SHL)
presenting on Recurrent and Stable Short Sleep Sequences in Young Adults

edition



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