2022 Annual Activity Report

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Message From Our Chair

As I review the sheer scope of achievement by the Raine Study in 2022, it's incredible to think that this was a year that started in the most uncertain of circumstances. In January 2022, the state of Western Australia where the Raine Study is based remained closed to all outside its borders, with no confirmed date for the reopening of borders or return to business as usual.

Fast forward 12 months and it's clear that 2022 was a year of significant progress, and a year in which an already high bar for success was placed even higher.

Highlights for the Raine Study in 2022 include:

- The development and ratification of our new 5-year strategic plan, along with a set of strategic pillars to guide all activity moving forward;
- Significant progress by our specialist teams to safeguard and improve access to the Raine Study's extensive data and biosamples holdings, now and into the future;
- Securing milestone funding from the Channel 7 Telethon Trust to begin recruiting our Generation 3 participants to be part of the Raine Study's standard follow-up, commencing with the Generations follow-up in 2023;
- The extent of planning which has gone into preparing for the new Generations follow-up while wrapping up data collection from the previous 28-year follow-up. This includes contact tracing and cohort consultation, grant applications, lab preparations, questionnaire development, and much more;
- The pivot of our annual scientific meeting from an event for scientists and researchers to the Symposium, an event with appeal and relevance across our diverse stakeholder groups – including a record attendance and participation by our participants as well as the Honourable Stephen Dawson MLC;
- Excellent progress on the scoping study for the proposed WA Cohort Data Portal;
- International impact and acclaim for research findings in fields as diverse as fertility, vision, pain, language development, and cardiometabolic health.

I would like to express our gratitude to our partners new (Channel 7 Telethon Trust, Stan Perron Foundation) and old (the Raine Medical Research Foundation, Lotterywest, the National Health and Medical Research Council and the Australian Research Council) for their ongoing support for the Raine Study.

I would also like to thank and acknowledge the contributions of all the members of the Board of the UJV – our participant representatives William Aitken (Generation 2) and Martin Becker (Generation 1), Professor Anna Nowak, from the University of Western Australia, Professor Gary Allison succeeded by Professor Melinda Fitzgerald from Curtin University, Professor John Olynyk from Edith Cowan University, Professor David Morrison succeeded by Professor Peter Davies from Murdoch University, Professor Gervase Chaney from the University of Notre Dame Australia, Professor Catherine Elliott from the Telethon Kids Institute, and Deborah Attard Portughes from the Women and Infants Research Foundation. For our research and institutional partners, the last two years of pandemic conditions have not been easy, and we are grateful for their renewed and ongoing commitment.

We are grateful to our new Patron, the Honourable Chris Dawson, Governor of Western Australia, and his wife Mrs Darrilyn Dawson for the vigour with which they

have embraced their patronage of the Raine Study, as well as his predecessor the Honourable Kim Beazley AC for his years of service and support. We wish him well in his new endeavours.

I extend my thanks to the Directors Professor Romola Bucks and Associate Professor Rebecca Glauert for their leadership, Operations Manager Aggie Bouckley for her stewardship of the Raine Study's finances, human resources, and facilities management as well as her role on the UJV Board, and Board Secretary Heather Amos for her invaluable support to the UJV Board and Directors.

Thanks also to Scientific Manager Blagica Penova-Veselinovic and her predecessor Dr Juliana Zabatiero, Senior Data and Biosamples Manager Alex D'Vauz, Follow-Up & Participant Engagement Manager Diane Wood, Communications Manager Kate Rowlands, and the entire team of the Raine Study for their dedication and hard work in the past year. Most of all, I thank our four generations of participants. Without you, there is no Raine Study.

Finally, this will likely be my last message as Chair of the Unincorporated Joint Venture Board of the Raine Study. After 5 years in the role, I think it is time to stand down as soon as we can make an appointment of a new Chair. It is fitting that I am able to hand over the role at a time when the Raine Study appears set to go from strength to strength.

While the last 5 years may not have played out the way we thought they would, it remains my firm belief that these challenges have also provided great opportunities for us. The Raine Study with its uniquely dedicated cohort of participants, world-class researchers, committed partners, staff and supporters has proven itself more than capable of evolving and adapting to any and all circumstances it may encounter. I wish everyone involved in the Raine Study the very best of luck in the future and thank you all for giving me the opportunity to be involved in this most glittering of "jewels in the crown" of health research in Western Australia.

Jan Stewart PSM
BA, MSW, HonDLitt.WAust, FAIM, GAICD
Chair, The Raine Study

Directors' Report

If 2021 was a time of change and transition for the Raine Study, 2022 was the year that all the effort that has gone into planning, grant writing, networking, profile raising and more, started to pay dividends. While it commenced as the year that the global pandemic finally arrived in Western Australia, 2022 was the year that our vision for the future of the study was clarified, ratified by the Raine Study's Unincorporated Joint Venture board, and operationalised with the production of our new 5-year strategy.

A key output of the strategic planning process was the identification of 5 key pillars to guide Raine Study activity moving forward. These pillars are:

1. **Participant Involvement:** We want enduring and mutually rewarding relationships with our participants and their families
2. **Research Discovery and Translation:** We want to answer the important questions that will enhance lives and build the next generation of researchers
3. **Data Asset Management:** We want to maximise the impact of our data
4. **Telling Our Story:** We want to share our unique insights and build a community of advocates
5. **Sustainable Future:** We want to secure the Raine Study for future generations

This has now become the framework upon which all our activities rest. While our goals are hefty and we may not be able to achieve everything we want to achieve, right now, we believe this plan is putting us in the best possible position to be able to start achieving our potential.

Progress Against Our Strategic Plan

With these pillars front of mind, a review of 2022 shows that progress is being made in each of our strategic pillars, and in ways that position us for future success.

1. Participant Involvement

Participants are at the heart of everything we do at the Raine Study. Without their ongoing voluntary commitment to taking part in our data collection, serving on our operations and scientific committees, consulting, and providing input to specific research projects, there is no Raine Study.

To start 2022, we analysed feedback from nearly 350 participants who had provided input about what health and wellbeing topics they thought should be included in the upcoming Generations follow-up. We referenced these findings on many occasions throughout the year and they were used to help guide our Generations follow-up planning.

We welcomed many new faces from Perth and interstate to our Raine Study Community Advisory Committee (RSCAC) and farewelled some long-standing members. The RSCAC comprises representatives from our Gen1 and Gen2 participant groups who meet quarterly with the Raine Study's leads and who help guide the future direction of the Raine Study through their involvement in the Raine Study's UJV Board, Scientific Review Committee and Operations Management Committee.

In May we reached the incredible milestone of 500 participants taking part in our heart function study, the very last study of our 28-year follow-up. This follow-up originally started in early 2020, but was impacted by COVID-19, however we were fortunate to welcome back our out-of-state participants to take part in the follow-up once border protection measures were eased.

By the end of the year, planning for the Generations follow-up had reached maximum speed. This history-making follow-up will see us invite the entirety of our Generation 1 and Generation 2 participants to take part in the assessment and collect data from both generations simultaneously: something we have not been able to do since the very start of the Raine Study. We have conducted several focus groups with participants to get their thoughts and ideas for the direction of the follow-up and have heard loud and clear that they would like to see the next generation of Raine Study offspring (the children of our Generation 2s, known as Generation 3) incorporated into the study soon. The late December news that we would receive landmark funding from the Channel 7 Telethon Trust for 2023 will allow us to begin making this happen.

2. Research Discovery and Translation

We followed through on our commitment to reinvigorate the function of the Raine Study's Special Interest Groups (research focus areas, SIG), the framework which enables our 350+ researchers to collaborate across their area of research. By the end of 2022 we had hosted two SIG-focused workshops for researchers, appointed new leaders in two of our twelve SIGs, and were fortunate to retain the support of 23 researchers from around Australia who agreed to continue in their existing roles as champions of our SIGs.

We supported 43 new project applications, including 22 grant applications and 21 research proposals. Of the 22 grant applications, 12 of these sought to leverage the Generations Follow-up commencing in 2023.

Raine Study researchers continued to conduct life-changing, world-leading research based on our unique data holdings. A total of 45 papers using Raine Study data were published in peer-reviewed academic journals around the world in the period January-December 2022, covering a range of topics across the human lifespan as diverse as pain, vision, cardiometabolic health, neurological development, and fertility. Twenty of these involved authors with international affiliations, which is testimony to the reach and impact of the Raine Study globally.

3. Data Asset Management

After 33 years, the Raine Study's data holdings are extensive. Comprehensive and detailed information has been collected from the children born into the Raine Study

since birth up to 28 years of age as well as from their parents, grandparents, and offspring via smaller sub studies. This covers questionnaire data, clinical assessment information and biological sample results.

Since 2019, our Data Management team has worked to clean and curate all these data as the foundation for developing a single relational database to house our complete data holdings since the study began in 1989. This heroic task was nearly complete by the end of 2022.

In addition to the cleaning of existing data, work also continued to harmonise the data held by the Raine Study across all completed follow-ups prior to uploading it to the database. This will continue to be a focus of the data management team in 2023.

The Biosamples team has been busy setting up a new laboratory at the University of Western Australia, allowing us to spin and process our samples onsite.

We started the process of auditing our existing samples before ultimately uploading them to a single specialist sample database. The audit commenced with the samples which are stored at King Edward Memorial Hospital. The next phase will require an audit of Raine Study biosamples held at Telethon Kids Institute and Royal Perth Hospital Medical Research Foundation. All of this will help us support our researchers more efficiently, as demand for biological sample analyses continues to increase.

Against this backdrop, the team continued to respond to researcher requests, receiving 7 requests to access biosamples and facilitating 59 data access requests. The team also developed updated guidance for researchers about fees for data curation and data access, as well as updating the Researcher Engagement Policy.

4. Telling Our Story

In September, we held the 2022 Raine Study Symposium event, a reimagining of our Annual Scientific Meeting, intended to help us tell the whole story of the Raine Study. We showcased the breadth and depth of opportunities the Raine Study can offer researchers at all stages of their careers, from students and early career researchers to world-renowned experts. We celebrated the contributions of our participants, welcoming more than 75 participants of all ages to the event, and were privileged to hear their thoughts on the future direction of the Raine Study. The event also provided a platform to celebrate the value of partnerships with presentations from our oldest funding partner (the

Raine Medical Research Foundation) as well as one of our newest (the Stan Perron Charitable Foundation).

In addition to this event, the communications focus for 2022 was preparation for the Generations follow-up. This included communications to researchers about the opportunities available to them and the deadline for grant applications to fund their desired activity, and a full suite of communications to participants that the Generations follow-up was coming. Throughout 2022, the team had a specific focus on finding and re-engaging those participants who were "lost" to us, for whom we did not have up to date contact information, or those who had stopped coming to assessments.

Communications encompassed social media platforms with growth across all four platforms on which the Raine Study is active (Facebook, Instagram, LinkedIn, and Twitter), newsletters, and engagement with media to promote the Raine Study's ongoing achievements.

The communications team was proud to support 660 hours of communications internship opportunities through UWA's Work Integrated Learning program, as well as additional voluntary time from 6 of these 8 interns to support the Symposium event. Conversations have commenced about extending these internship opportunities to our other UJV partners. The interns completed activities designed to help tell the story of the Raine Study's impact, from plain language summaries of scientific publications to the creation of graphics, video and written content for the Raine Study's website and social media platforms.

5. Sustainable Future

We continued to make headway in establishing and strengthening the Raine Study's relationships and partnerships with key stakeholders, academic and other research organisations, and funding bodies in Western Australia.

We started 2022 by celebrating the generosity of the Stan Perron Charitable Foundation in awarding landmark funding to help safeguard the future of the Raine Study. This grant has enabled investment in strategic planning and in the capacity of our specialist staff required to improve and enhance access to the Raine Study's extensive biosamples and health data.

We ended the year with the news that we had been awarded equally significant grant funding by the Channel 7 Telethon Trust, which will allow us to start the process of including Generation 3 participants in our already ground-breaking Generations follow-up.

With funding from Lotterywest, we made significant progress developing the strategic plan for a WA Cohorts Data Portal in partnership with our fellow Western Australian cohort studies, the Busselton Health Study and the ORIGINS Project, submitting two Medical Research Future Fund Infrastructure Grant applications to secure support.

In terms of public sector engagement, we hosted WA's Chief Scientist Professor Peter Klinken at the Raine Study and heard him acknowledge the value that the Raine Study has delivered to health and scientific discovery over the last three decades. Further demonstrating the importance of the advocacy and relationship-building undertaken by the Raine Study's leadership, the WA Minister for Medical Research, Volunteering, and Innovation and ICT, Stephen Dawson, attended and provided the official welcome to the Raine Study's Symposium event in September.

We farewelled outgoing WA Governor and Raine Study Patron the Honourable Kim Beazley, and were delighted when WA's new Governor, the Honourable Chris Dawson accepted the invitation to become our new Patron.

Lastly, we facilitated regular and consistent meetings of the committees which support the function of Raine Study activity across the organisation. These are the Scientific Management Committee (fortnightly meetings), Combined Operations Management Committee and Whole Team Meetings (6 meetings), Scientific Review Committee (2x face-to-face and 7x online meetings), and the Raine Study's

Community Advisory Committee (4 meetings).

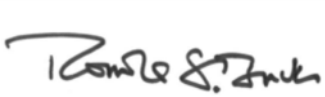
2023 Outlook

As we look ahead to 2023, we feel confident that we are in a strong position to deliver on the foundations laid in 2022:

- Three generations of participants are engaged and expect to book their follow-up appointments as part of the Generations follow-up over the next three years, with 5 of a potential 10 new staff members recruited to facilitate the follow-up.
- Continuing to work closely with the researchers who have received grant funding to support additional data collection during the Generations follow-up outside of the core measures, as well as partnering with researchers in their ongoing work which is separate from the Generations follow-up.
- The data and biosamples team continue working towards a single relational database and single specialist biosamples database to improve access to our three decades of participant data.

On behalf of the entire Raine Study team, we are delighted to present the Raine Study's 2022 Annual Activity Report. We would like to acknowledge and thank our participants, our researchers, and our funders, particularly the University of Western Australia, the Raine Medical Research Foundation, the Stan Perron Charitable Foundation, Lotterywest and the Channel 7 Telethon Trust for their support of the Raine Study.

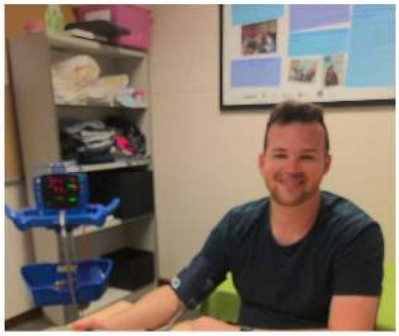
We thank our UJV Board partners, the University of Western Australia, Curtin University, Edith Cowan University, Murdoch University, the University of Notre Dame Telethon Kids Institute, the Women's and Infants Research Foundation, and our two participant representatives on the UJV Board William Aitken and Martin Becker, and our Institutional Associate Members: Flinders University (South Australia) and the University of Newcastle (New South Wales), for their continued support of the Raine Study. 2022 was an incredible year for the Raine Study. With the inestimable support of all our stakeholders, we look forward to reporting on continued success in 2023!



Professor Romola Bucks
Director, The Raine Study

Associate Professor Rebecca Glauert
Scientific Director, The Raine Study

About The Raine Study



Established in 1989, the Raine Study is the oldest pre-birth longitudinal study in the world, and the most extensive and successful survey of life-course health from the womb to adulthood ever undertaken.

Cohort participants have taken part in 17 follow-ups over 33 years. More than 650 peer-reviewed journal articles have been published as a result.

Starting in 2023, the Generations follow-up will be our largest ever and will last at least 3 years.

4
generations

2,900
pregnant women recruited (Generation 1)

2,868
children born into the study (Generation 2)

750+
offspring born to the original children (Generation 3)

30,000
pieces of data per participant

30 million
pieces of genetic information per participant

Our Mission

To **improve lifelong health** and quality of life through ground-breaking, **impactful research** that examines the influences, pathways, and outcomes from before birth and throughout life's course.

Our Values

We are **committed** to innovation, discovery, and scientific rigour. Our staff, researchers and participants do what they do for the greater good.

We offer a scientific environment that is flexible, respectful, and **collaborative** to our participants, researchers, and all those we work with.

We are endlessly **curious**. We search for new discoveries that can improve human health and quality of life. This is what motivates us.

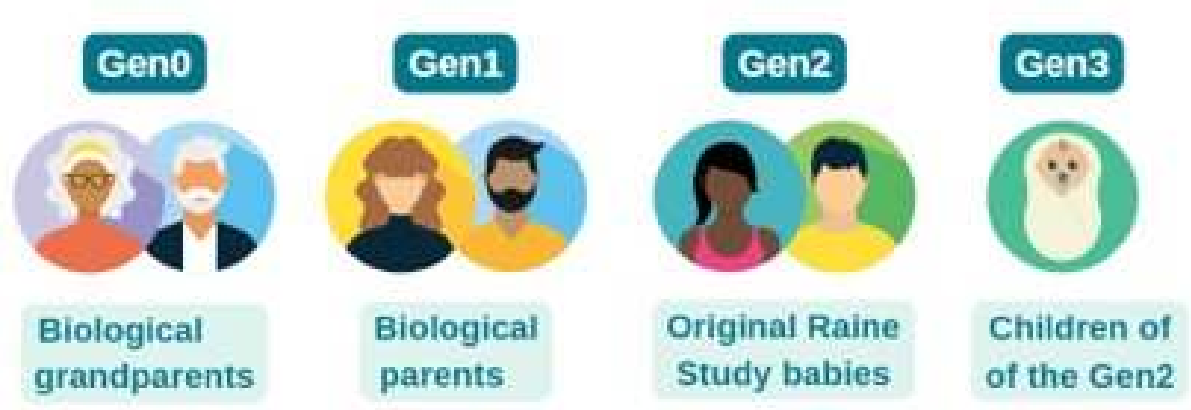
We know the only constant is **change**. We must keep reinventing ourselves and redefining the value we bring to stay ahead.

What We Do

The Raine Study is a longitudinal cohort study. It relies on the same group of genetically related family members originally recruited between 1989 and 1991 to participate in each follow-up. The longer the same people continue to take part in the study, the more valuable their data become.

Based in Perth, 2,900 pregnant women (Gen1) were recruited to be part of the Raine Study between 1989 and 1991, giving birth to 2,868 children (Gen2, the initial focus of the Raine Study). Our Gen2 participants are now in their early 30s and have taken part in a remarkable 17 follow-up studies since before they were born until now, each contributing over 30 million pieces of genetic data. Over 73% of our Gen2 participants are still actively involved in Raine Study assessments.

In addition to the original Gen1 and Gen2 participants, the Raine Study has recruited 109 grandmothers (Gen0) of the original Raine Study children, as well as more than 750 babies (Gen3) who were born to our now adult Gen2 participants.



Extensive Multi-Generational, Multi-Domain Data

Comprehensive and detailed information has been collected from the mothers (Gen1) in early pregnancy and from their children born into the Raine Study (Gen2) since birth

up to 28 years of age. More recently, data from Gen2 grandparents (Gen0) and Gen2 offspring (Gen3) have also been collected.

This includes questionnaire data, clinical assessment information and biological sample results. Biological samples include antenatal blood, cord blood, placenta, milk teeth, blood, saliva, urine and DNA.

Life-Course Research

Hundreds of researchers in Australia and around the world use data collected and collated by the Raine Study to power breakthrough discoveries across all aspects of human health including cardiometabolic health, diet, education and work, physical activity, sleep health, reproductive health, respiratory health, hormones, immunology, mood, and mental health, and more.

Advancing Knowledge, Changing Lives

By the end of 2022, 687 peer-reviewed journal articles had been published based on Raine Study research data. Because of the Raine Study, the medical world has:

- Confirmed the **safety of ultrasounds** for pregnant women and their babies
- Established the **accepted normal growth ranges** for fetal, infant and child height and weight charts, which are used in Australia and around the world
- Confirmed the long-term health benefits of **breastfeeding**
- Identified the genes associated with **childhood asthma and allergies** as well as the link between **vitamin D and healthy vision**
- Developed new ways of predicting and understanding the onset of common health conditions such as **obesity, hypertension, diabetes, heart disease, depression, anxiety** from before birth
- Identified new epidemiological associations (cause and effect) for numerous **child and adult health issues caused by mothers smoking and drinking while pregnant:**
    - Adolescent anxiety
    - Depression
    - Behavioural issues
    - Neurological outcomes
    - Risk-taking behaviour (smoking, cannabis use, excessive alcohol use)
    - Decreased male fertility
- Provided assurance that from adolescence through to early adulthood, **children conceived via IVF** have no different health outlook from their naturally conceived counterparts.

Governance and Board

The Raine Study was initially managed through King Edward Memorial Hospital, then in early childhood its management shifted to what was then the Telethon Institute for Child Health Research, and now is the Telethon Kids Institute.

In 2007, a Memorandum of Understanding was signed to establish a clear collaborative governancestructure based on an Executive Committee chaired by the Dean of Medicine at the University of Western Australia and supported by a Scientific Director.

As the Raine Study participants matured, the offices for the Raine Study were moved to facilities at UWA in 2014. The Raine Study's host is the School of Population and Global Health, headed by Professor Colleen Fisher, at the University of Western Australia.

Unincorporated Joint Venture

In 2017, following a review of the governance structure, it was decided to establish an Unincorporated Joint Venture which replaced the previous Raine Study Executive Committee.

The parties agreed to facilitate the development of an optimum governance structure for the RaineStudy, with a clear framework for the ownership, custodianship, and control of assets of the Raine Study including data, biological samples, and intellectual property. The Terms of Reference provide for the appointment of an independent chair by consensus of the members of the UJV.

The UJV is a collaborative partnership agreed between the University of Western Australia, Curtin University, Edith Cowan University, Murdoch University, the University of Notre Dame Australia, Telethon Kids Institute, and the Women and Infants Research Foundation. 2021 marked the completion of the original terms of the Joint Venture Agreement. All partners have committed to a new Joint Venture Agreement for the period 2022-2027.

UJV Board Members 2022

The Raine Study UJV Board is comprised of representatives from each partner to the Unincorporated Joint Venture agreement, representatives of the Raine Study participant community (Generation 1 and Generation 2), and an independent Chair (Jan Stewart).

Members are expected to attend 3-4 meetings per year, engage in the initiatives and the outcomes being pursued by the Raine Study, and advocate for the Raine Study in the broader community.

In 2022, the members of the UJV Board were:

- Martin Becker (Gen1 Participant, The Raine Study)
- William Aitken (Gen2 Participant, The Raine Study)
- The University of Western Australia: Professor Anna Nowak
- Curtin University: Professor Garry Allison, succeeded by Professor Melinda Fitzgerald in September 2022
- Edith Cowan University: Professor John Olynyk
- Murdoch University: Professor Peter Davies

- The University of Notre Dame Australia: Professor Gervase Chaney
- Telethon Kids Institute: Professor Catherine Elliott
- Women and Infants Research Foundation: Deborah Attard-Portughes
- Professor Romola Bucks (Director, The Raine Study)
- Associate Professor Rebecca Glauert (Scientific Director, The Raine Study)
- Aggie Bouckley (Operations Manager, The Raine Study)

The Board is supported by Heather Amos (Administrative Officer, The Raine Study) as Board Secretary.

Martin Becker
Generation 1 Participant

William Aitken
Generation 2 Participant

Professor Anna Nowak
The University of Western Australia

Professor Garry Allison
Curtin University

Professor John Olynyk
Edith Cowan University

Professor Peter Davies
Murdoch University

Professor Gervase Chaney
The University of Notre Dame Australia

Professor Catherine Elliott
Telethon Kids Institute

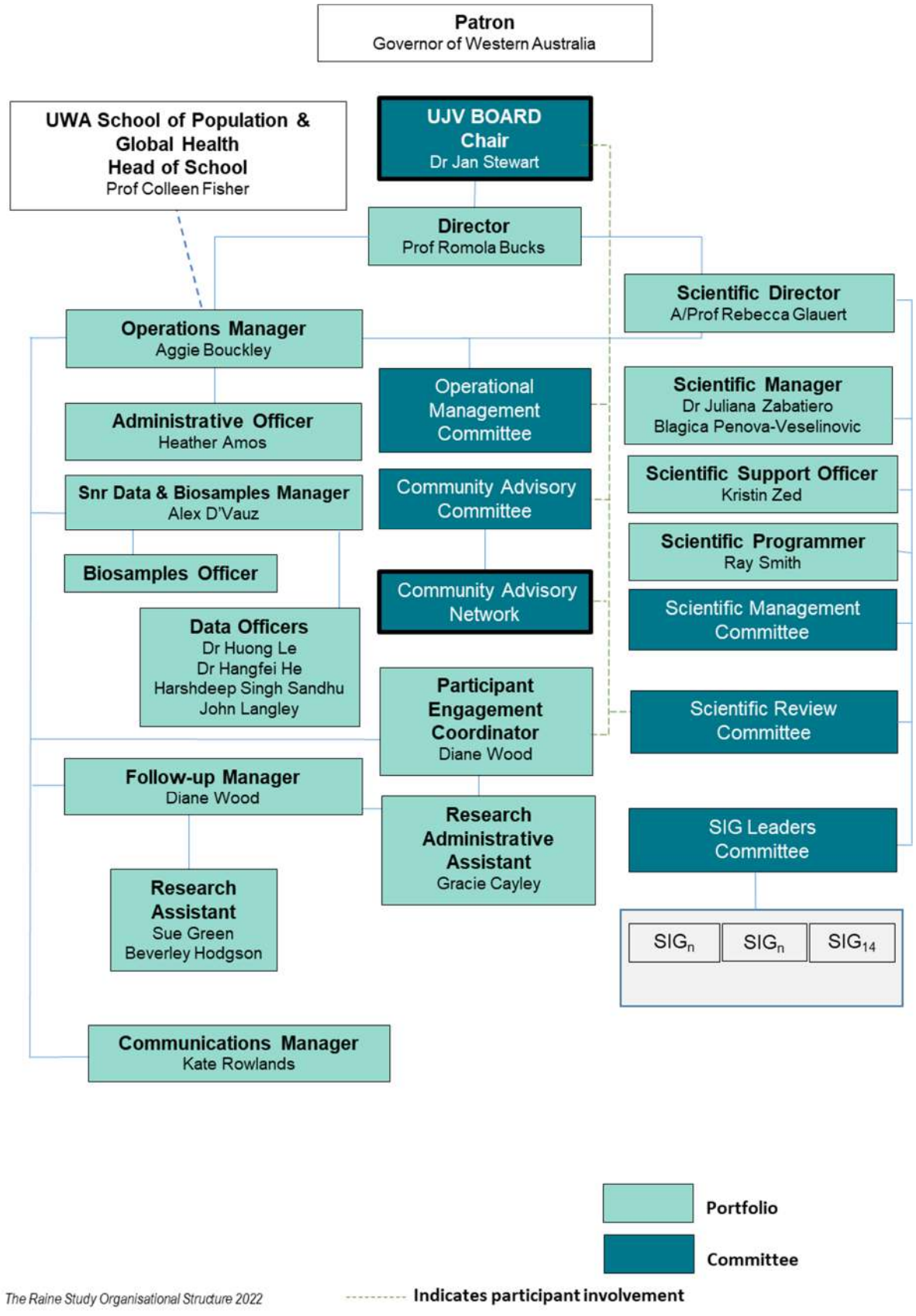
Deborah Attard Portughes
Women & Infants Research Foundation

Professor Romola Bucks
The Raine Study

Associate Professor Rebecca Glauert
The Raine Study

Aggie Bouckley
The Raine Study

Organisation and People



The Raine Study Organisational Structure 2022

Patron

His Excellency the Honourable Chris Dawson APM, Governor of Western Australia

His Excellency the Honourable Chris Dawson APM was sworn in as the 34th Governor of Western Australia on 15 July 2022. He formally accepted the Raine Study's invitation to become its Patron in October 2022 succeeding the outgoing Governor, the Honourable Kim Beazley AC, his predecessor in both roles.

The Dawson family have been part of the early colonial settlers over five generations of farming and law enforcement. The Governor's great-great-grandparents arrived in the then Swan River colony in Western Australia in 1830.

Christopher John Dawson APM was educated at Perth Modern School before joining the Western Australia Police Force in 1976, going on to provide 46 years of service in Australian law enforcement. He served in country and metropolitan positions, criminal investigation, training, and senior roles. The Queen's Birthday Honours List in 2002 saw him awarded the Australian Police Medal for distinguished service.

After 10 years as Deputy Commissioner, he left WA for a national role in Canberra between 2014 to 2017 as Chief Executive Officer of the Australian Crime Commission, amalgamating several agencies into the Australian Criminal Intelligence Commission. He also served as Director of the Australian Institute of Criminology during this period.

He was appointed Commissioner of the Western Australia Police Force in August 2017, serving until July 2022. During the period of the COVID-19 global pandemic, Commissioner Dawson coordinated the State of Emergency and the Vaccine program.

Unincorporated Joint Venture Board Chair

Jan Stewart PSM

The Chair of the Raine Study's Unincorporated Joint Venture Board (UJV) is a voluntary position, held by an individual who is independent of any of the institutions represented on the Board. Their role is to lead the board by engaging individual board members to work as a unit, convening and facilitating board meetings, supporting the Raine Study's Directors, and ensuring that the Raine Study is being managed in accordance with best governing practices.

Director Portfolio

Director: Professor Romola Bucks

The Director sets the overall strategy for the Raine Study. They develop collaborations and partnerships and ensure that all activity undertaken across the different portfolios is in the Raine Study's best interest. The Director has oversight of how Raine Study resources are applied with the goal of ensuring good scientific practice, optimal utilisation of scientific data, and maximum publication output. Together with the Scientific Director the Director is responsible for protecting and advancing the Raine Study's reputation and ensuring that its scientific findings are promoted to public health policy makers.

Scientific Director Portfolio

Scientific Director: Associate Professor Rebecca Glauert

The Scientific Director's role is to develop the Raine Study's research quality, quantity, and impact while maintaining high quality science and feasibility of research projects and identifying and developing research ideas. The Scientific Director monitors researcher commitment and capacity to facilitate research projects within and across

research themes. The Scientific Director promotes the Raine Study's scientific reputation and ease of involvement for researchers, oversees scientific conduct, ensures project and manuscript quality, and interacts with policy and service providers.

Operations Management Portfolio

Operations Manager: Aggie Bouckley

The Operations Manager is tasked with ensuring that there are efficient supports and management of all Raine Study resources and processes. The Operations Manager is responsible for high level human resource, facility, and finance administration and has oversight of the corporate support portfolio, follow-up portfolio, participant engagement portfolio, data and biosamples portfolio, and communications portfolio, to ensure effective coordination of activities across each of these. The Operations Manager is supported by the Corporate Support Portfolio.

Corporate Support Portfolio

Administrative Officer: Heather Amos

The Corporate Support Portfolio provides essential support services to the UJV Board and the Board Chair, the Raine Study Directors and the Operations and Science Portfolios. The administrative aspect of the portfolio looks after the day-to-day running of the Raine Study office ensuring efficient support for recruitment, procurement, and research activities, as well as assisting with the Raine Study's Annual Research Symposium and other key events.

Scientific Portfolio, Research Project Management Portfolio

Scientific Manager: Blagica Penova-Veselinovic

Scientific Support Officer: Kristin Zed

The Scientific Portfolio supports the science activities of the Directors and the broader Raine Study research community. This portfolio identifies and supports opportunities for translation of Raine Study's discoveries, prepares grant submissions by the Raine Study, manages the science aspects of grant applications by researchers, pursues scientific promotion activities, reviews science content, and provides efficient support for members of the Raine Study's research community.

The Research Project Management Portfolio is responsible for ensuring efficient and high-quality research processes. The portfolio staff review project proposals and manuscript ideas for similarity, provide approvals for the release of biological samples and data for research purposes, and ensure all acknowledgements are correctly included in the final output. This portfolio contributes to the continuous improvement of the Raine Study's research systems and processes.

Data and Biosamples Management Portfolio

Senior Data and Biosamples Manager: Alex D'Vauz

The Raine Study Data and Biosamples Management Portfolio is responsible for maintaining the highest-quality curation of the Raine Study's data and biological sample resources. This team works to ensure that the Raine Study's 30+ years of longitudinal data is cleaned and harmonised and ready for transfer into the newly developed data repository. They are also tasked with the curation and secure storage of the Raine Study's biological samples across multiple secure sites. Thirdly, they provide advice and support to researchers to help them understand how to access and make best use of these resources, through all stages of their research project.

Follow-Up Management Portfolio, Participant Engagement Portfolio

Overall Follow-Up Manager: Diane Wood

The Follow-up Manager is responsible for ensuring a coordinated approach across all follow-up activity to achieve the highest possible quality data and efficiency for the Raine Study. The Follow-up Manager applies project management, research methodology, good clinical practice techniques and the latest occupational health, safety, and risk standards to develop best-in-class assessment procedures to collect new data and biological samples from the Raine Study participants. This portfolio works closely with cohort participants and researchers to maximise both the ease of participation in assessments, and optimal data output for researchers to use.

The Participant Engagement Portfolio is tasked with enhancing participant experience of the Raine Study, to ensure they feel valued for their involvement and committed to staying involved into the future. They recruit and coordinate cohort representatives and focus groups, manage participant engagement activities (formal and informal), and advocate on behalf of participants. The portfolio works with other key portfolios to develop promotion activities, gain participant perspective, and input for future studies, and administer all cohort contact outside of follow-ups. They are also responsible for ensuring the maintenance, confidentiality, and security of the cohort database.

Communications Portfolio

Communications Manager: Kate Rowlands

The Communications Manager is responsible for all aspects of external marketing and communications on behalf of the Raine Study. They ensure that participants and researchers stay engaged and connected with the Raine Study through the Raine Study website, social media, digital communications, media coverage and events, and that external stakeholders and partners understand the unique value of the Raine Study and are committed to securing its future. The Communications Manager works closely across all the portfolios to ensure that all the elements of the Raine Study's story are up to date and resonate with their target audience.

Committees

Scientific Management Committee

The Scientific Management Committee manages all science-related activities for the Raine Study and is comprised of the Scientific Director, Scientific Manager, Director, Data and Biosamples Manager, Follow-up Manager, Scientific Support Officer, and the Operations Manager.

Members in 2022 were Professor Rebecca Glauert, Dr Juliana Zabatiero, Blagica Penova-Veselinovic, Professor Romola Bucks, Alex D'Vauz, Diane Wood, Kristin Zed, and Aggie Bouckley.

Scientific Review Committee

The Scientific Review Committee was set up to provide a high-quality review of scientific projects and science strategy. The members provide expert advice on science, feasibility and significance of proposed projects, input on processes supporting and monitoring science activity, and input on curation and utilisation of biosamples and data.

In 2022, membership was comprised of Professor John Newnham, Professor Lawrence Beilin, Professor Megan Galbally, Professor David Mackey, Professor Susan

Prescott, Professor Trevor Mori, Associate Professor Rae-Chi Huang, Dr Johnny Lo, Dr Phillip Melton, Dr Lisa Gibson, Professor Romola Bucks, Professor Rebecca Glauert, Dr Juliana Zabatiero, Blagica Penova-Veselinovic, Kristin Zed, Roland Kerr (Gen2 participant) and Dr Alison Kerr (Gen1 participant).

Special Interest Group Leaders Committee

The Raine Study investigators bring expertise from 14 Special Interest Groups (SIGs) which are aligned to a life-course framework covering multidisciplinary expertise and multiple time points.

Within this life-course framework, the SIGs are organised across four overarching pillars of health research: Physical Health, Mental Health, Lifestyle, and Genetics. There is also a cohort-methods SIG to support the quality and efficiency of analyses.

Each SIG is led by 1-2 people representing a specific specialist area, selected, and appointed by the Raine Study Directors. They work with the Raine Study team to maximise the utility and use of data in their area of expertise. They guide researchers interested in their area to expand activities and look to identify new expertise and researcher talent to attract to the SIGs (local, national, and international); advise on opportunities to collaborate with other SIGs; attract new research projects; attract new funding opportunities; and create student research opportunities.

The Raine Study SIG leaders in 2022 were:

- Biological Resources: Professor Romola Bucks, Associate Professor Rebecca Glauert
- Cardiometabolic: Dr Koya Ayonrinde, Professor Trevor Mori
- Cohort Methods: Professor Max Bulsara, Ms Angela Jacques
- Diet: Professor Therese O'Sullivan
- Education and Work: Dr Lynette Vernon
- Environmental and Perinatal Exposures: Dr Peter Franklin, Dr Shin Lee
- Genetics: Dr Phillip Melton, Professor Craig Pennell
- Health Risk Behaviour: Dr Jennifer Marino, Professor Rachel Skinner
- Hormonal and Reproduction: Professor Roger Hart, Professor Martha Hickey, Dr Melanie Walls
- Mental Health and Cognition: Associate Professor Ashleigh Lin, Dr Monique Robinson
- Musculoskeletal: Dr Robert Waller
- Respiratory, Immunology and Inflammation: Dr Rachel Foong, Dr Emma de Jong
- Senses (Hearing and Vision): Dr Chris Brennan-Jones, Adjunct Professor Rob Eikelboom, Professor David Mackey
- Sleep and Activity: Associate Professor Joanne McVeigh, Dr Nigel McArdle

Community Advisory Committee

The Raine Study's Community Advisory Committee provides community perspective and input into Raine Study activities. They are tasked with contributing ideas to enhance participant engagement, identify areas of research that may be important to the Raine Study community, and provide feedback on the relevance, understanding and value of the research. This committee meets quarterly with the Raine Study team and researchers and helps guide the future direction of the Raine Study, providing input into issues raised by staff, researchers, and our partners.

Members in 2022 were Roland Kerr (Chair), Amanda Aitken, William Aitken, Aliesha Arbuthnot, Rachael Avison, Martin Becker, Rosanna Candler, Margret Crocker, Stephan Elliott, Jacqui Graham, Alasdair Hill, Rosemary Irvine, Dr Alison Kerr, Michelle Keye, Angela Knight, Oliver Locke, Rachel O'Sullivan, Ruth Page, Cornel Scheibling, Genevieve Scott, and Emma Woods.

Additionally, Martin Becker and William Aitken represented the Community Advisory Committee on the UJV Board, Cornel Scheibling on the Operations Management Committee and Dr Alison Kerr and Roland Kerr on the Scientific Review Committee.

Operations Management Committee

The Raine Study Operations Management Committee ensures communication and coordination between operational and scientific components of the Raine Study. It is responsible for facilitating the effective management and operations of the Raine Study in the key areas of administrative and financial support. The committee comprises each of the portfolio leads plus two participant representatives, one from generation 1 and one from generation 2. Members of the Operations Management Committee in 2022 were: Aggie Bouckley (Chair), Heather Amos (Secretary), Professor Romola Bucks, Alex D'Vauz, Professor Rebecca Glauert, Sue Green, Blagica Penova-Veselinovic, Kate Rowlands, Cornel Scheibling (Gen1 Participant), Diane Wood, Dr Juliana Zabatiero, and Kristin Zed.

Summary of Committee Meetings in 2022

Meeting Type	Number of Meetings Held
Unincorporated Joint Venture Board	3 regular + 1 strategic planning
Operations Management Committee	6
Community Advisory Committee	4
Scientific Review Committee	2 in-person, 7 online meetings
Scientific Management Committee	13
Special Interest Group Leaders	2

Students and Interns

Research Students

In 2022, there were 53 students working with the Raine Study, with the majority enrolled in Doctor of Philosophy (PhD) and Master's degrees (Figure 1).

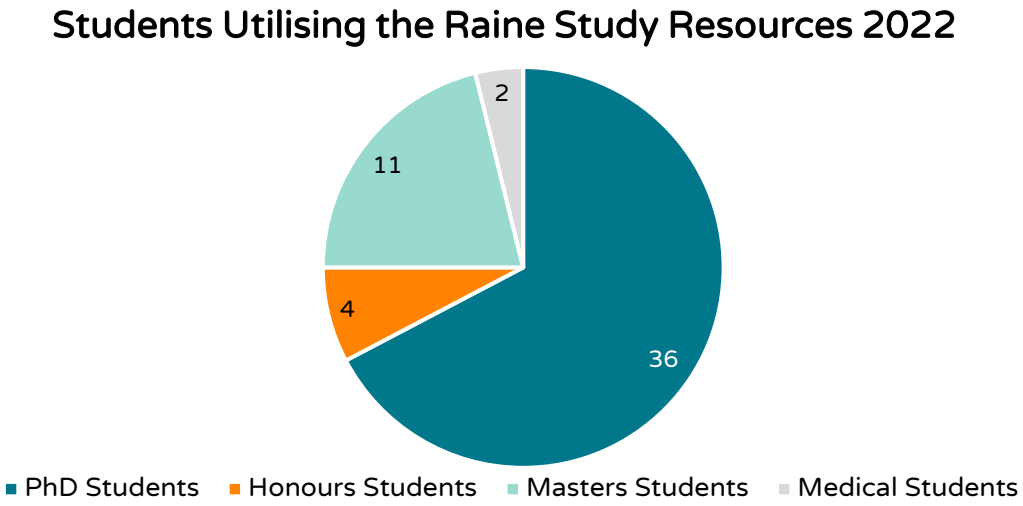


Figure 1. Students, by degree, who have utilised the Raine Study resources in 2022

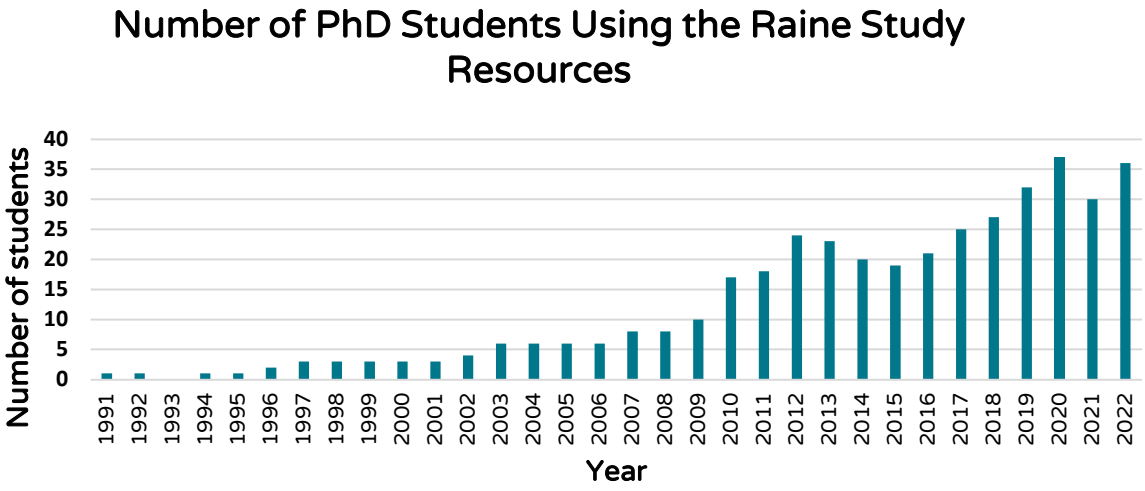


Figure 2. Number of students enrolled in a PhD program, who utilised the Raine Study resources, per year.

Interns

In 2022 the Raine Study hosted 8 undergraduate student interns from the University of Western Australia's Work Integrated Learning program. They came from a range of degree courses across Science and Arts/Commerce and provided the Communications Manager with science communications support. Projects include writing plain language summaries, compilation of proof points for the Raine Study's overall impact story, development of video, graphics and written content for social media and the website, event management support, and more. The Raine Study's intern program is continuing in 2023 and will be extended to students from the Raine Study's other Unincorporated Joint Venture board member institutions.

Follow-Up Management and Participant Engagement

The original Raine Study babies (Generation 2) have, on average, turned 32 years of age in 2022. From the original cohort of 2,868 babies born into the study, 2,096 remain registered as active participants, meaning that they have agreed to remain in the study and be contacted for future assessment.

Approximately 2,000 Raine Study parents (Generation 1) remain as active participants. To date, over 783 offspring (Generation 3) have been born to and registered with the Raine Study by our Generation 2 participants.

At the end of 2022, in preparation for the Generations follow-up in 2023, the Research Project Administrative Assistant finalised the contact tracing numbers across the generations. In summary, 2,275 participants were contacted, and 1,142 participants had their contact details updated ready to hand over to the Generations Follow-up team. The contact tracing process will continue as the participants are approached to be booked in for the Generations follow-up.

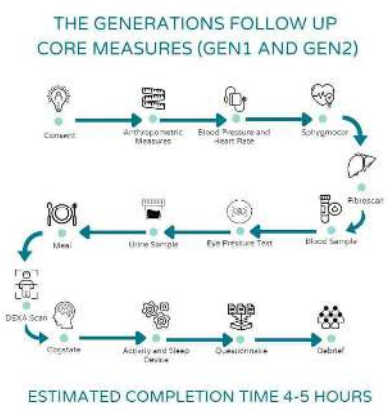
The Raine Study participant community continues to provide a valuable community perspective for all Raine Study operational and scientific activities. In 2022, the Raine Study Community Advisory Committee, consisting of 24 local and interstate Generation 1 and Generation 2 participants, reviewed their terms of reference. They are tasked with contributing to ideas for strategies to enhance participant engagement, identify areas of research that may be important to the Raine Study community, and provide feedback on the relevance, understanding and value of the research. Additional cohort consultation/participant engagement events have been conducted for researchers to showcase their proposals to the participants so that the participants can give their opinions about the proposed research and process.

Heart Function Follow-Up

In June 2022 the Raine Study completed collection of heart ultrasound data via an echocardiogram on the Generation 2 cohort as part of the Gen2-28-year follow-up. Data for this follow-up reached a milestone of at least 511 participants. We have enjoyed meeting many of our new Generation 3 participants (toddlers and babies) who have accompanied their Generation 2 participant parents to this round of follow-ups. Although they have not been part of the follow-up process at this time, we hope that this will change in the future.

Planning for the Generations Follow-Up (2023)

In 2022, the participant engagement teams focus was to communicate details about the new follow-up as broadly as possible. The Generations follow-up will collect consistent data and samples from both Generation 1 (parents of these born into the study) and Generation 2 (born into the study from 1989-1992) participants at the same point in time (not as an add-on or sub-study), which is something that we have never been able to do before. This will open many new avenues for future research using the Raine Study data, which in turn will add significantly to the ongoing value of the Raine Study to researchers in Australia and around the world.



Communications to participants have increased significantly through social media, newsletters, emails, website content, events, and news coverage. In addition to informing them about the upcoming follow-up, communications to participants have encouraged them to update their details, celebrated milestones, and offered plain language translation of research outcomes in academic publications.

Grant Funding

Grant Applications 2021 (for funding in 2022)

Out of nineteen (19) grant or fellowship applications prepared and submitted in 2021 for projects to commence in 2022 (a potential funding total of AU$9,178,510), four (4) were successful totaling AU$1,342,877.

Funded projects are detailed below:

1. Spinnaker Health Research Foundation Seed Grant 2022. O Ayonrinde. Determining factors that underpin cardiovascular disease risk in young adults with fatty liver diagnosed during adolescence ten years earlier – a longitudinal cohort study. AU$15,000.
2. Lotterywest. BMRI, ORIGINS, The Raine Study: Development of sector initiative to provide better knowledge sharing and improve the health and wellbeing of the WA community. R Bucks, R Glauert, A James, J Hui, J Davis, D Silva, P Watt. $206,600.
3. Stan Perron Charitable Foundation: Research People and Platforms 2021. R Bucks, R Glauert. Developing and safeguarding the Raine Study: Western Australia's largest longitudinal health study, from birth to adulthood. $873,391.4.
4. RMRF Raine Priming Grant. P Strauss. Examining factors associated with mental health difficulties and suicidality across childhood, adolescence, and early adulthood in LGBTQA+ young people. AU$247,886.

Grant Applications 2022 (for funding in 2023)

Twenty-eight (28) grant or fellowship applications totalling AU$80,197,533 were submitted in 2022 for projects commencing in 2023 of which seven (7) were successful totalling AU$714,494 and awaiting outcome for one (1). Fourteen (14) of the submitted grant/fellowship applications leveraged the upcoming Generations follow up.

Funded projects are detailed below:

1. Australian Research Council, Discovery Early Career Research Award (DECRA). YZ Foo. The effect of nutrition on male life history traits in humans AU$390,295
2. Gastroenterology Society of Australia, project grant. L Adams. Identifying precision nutrition approaches for metabolic dysfunction-associated fatty liver disease (MAFLD) by characterizing the gut microbiome. AU$45,455
3. Telethon 7 Trust Grant. D Mackey. Prevalence of infection from common currently unvaccinated infectious diseases that cause blindness. AU$187,427
4. Telethon 7 Trust Grant. R Glauert. Generation 3: Recruiting the next generation into the world's first pregnancy cohort study, The Raine Study. AU$122,892
5. UWA Business School small grant. A Preston. Understanding the gender gap in financial literacy: a study of GenY West Australians. AU$5,000
6. Future Health Research and Innovation Fund scheme through the WA Near-miss Awards (WANMA) 2021. O Ayonrinde. The natural history and clinical significance of adolescent-diagnosed nonalcoholic fatty liver disease and gastrointestinal disorders during adulthood – a cohort study AU$70,542
7. National Dairy Council (USA) - Digestive Health Grant (USA). K. Ivey. By beneficially altering microbiome, yogurt (the whole food) may be more beneficial to mental health than non-dairy probiotic supplements. AU$456,189 [US$ 303,994]

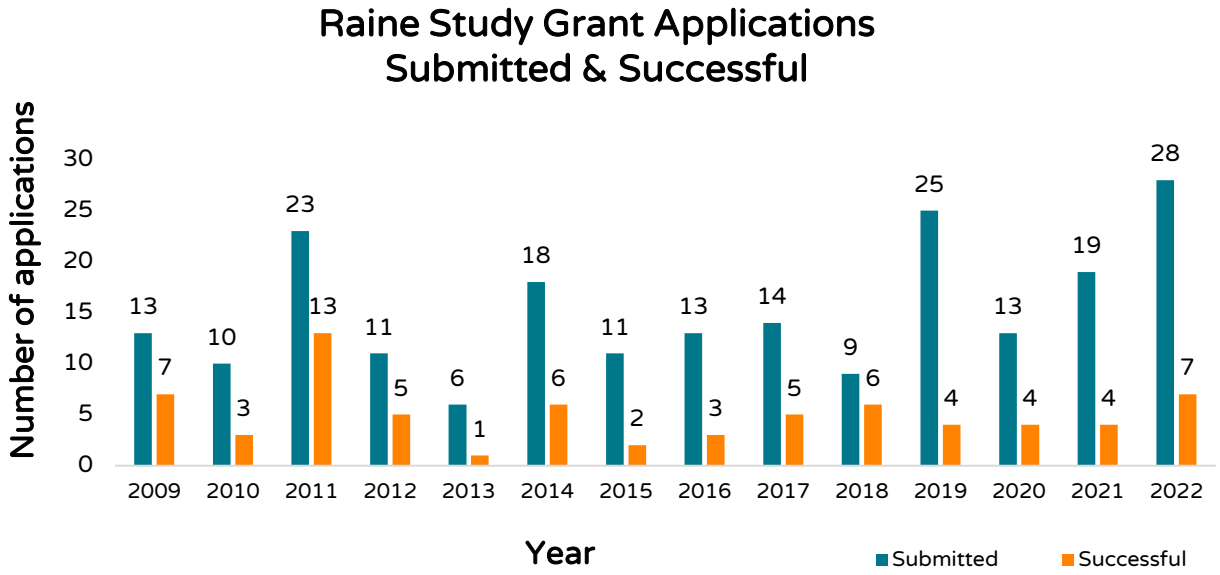


Figure 3. Successful grant applications 2009-2022

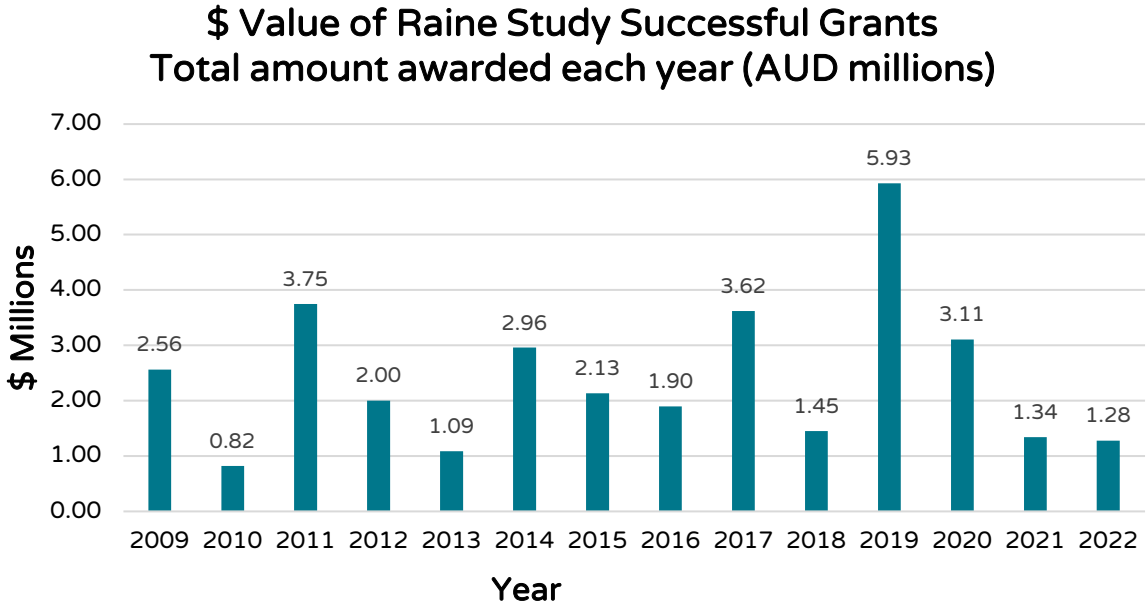


Figure 4. Total value of grants awarded 2009-2022 *(updated 2024)*

Projects Update

In 2022 there were 43 new project applications, 65 new data access and biosamples requests and 41 new manuscript submissions. The manuscript proposal form was made redundant in June 2022, as such there were 13 manuscript proposals submitted between January and June 2022.

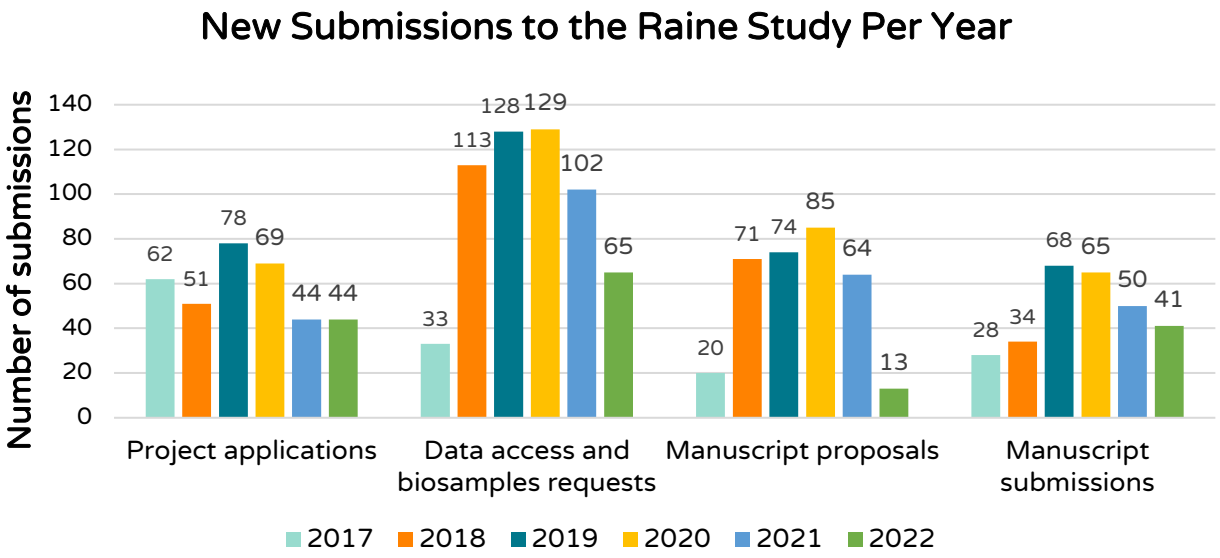
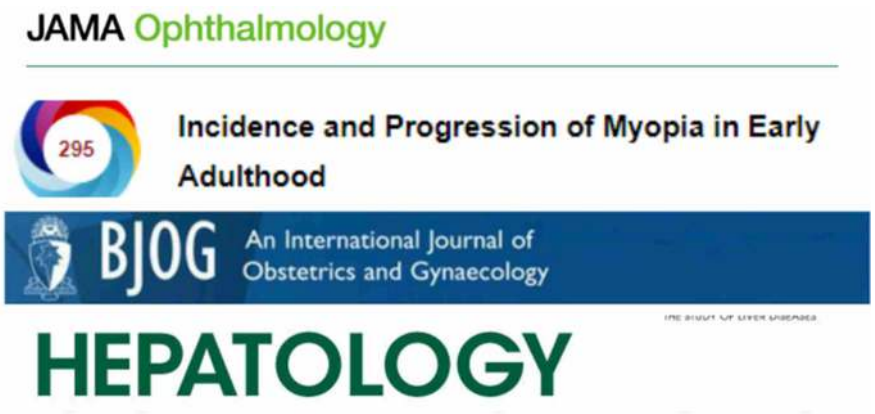


Figure 5. New applications 2017-2022

Research Translation, Dissemination & Impact

Publications Summary

In 2022, 44 peer-reviewed papers were published (including eight electronic publications from 2021 that were published ahead of print, and indexed in 2022), 20 of which included authors with international affiliations. This brings the publication total for the Raine Study to 687 (Figure 6), with 89% of these in journals with impact factors of 2 or greater (Figure 7). The number of 2022 Raine Study peer reviewed publications by researchers affiliated with local institutions (UJV financial partner institutions and affiliate member organisations) are presented in Figure 8. See **Appendix** for the full list of peer-reviewed papers published in 2022.



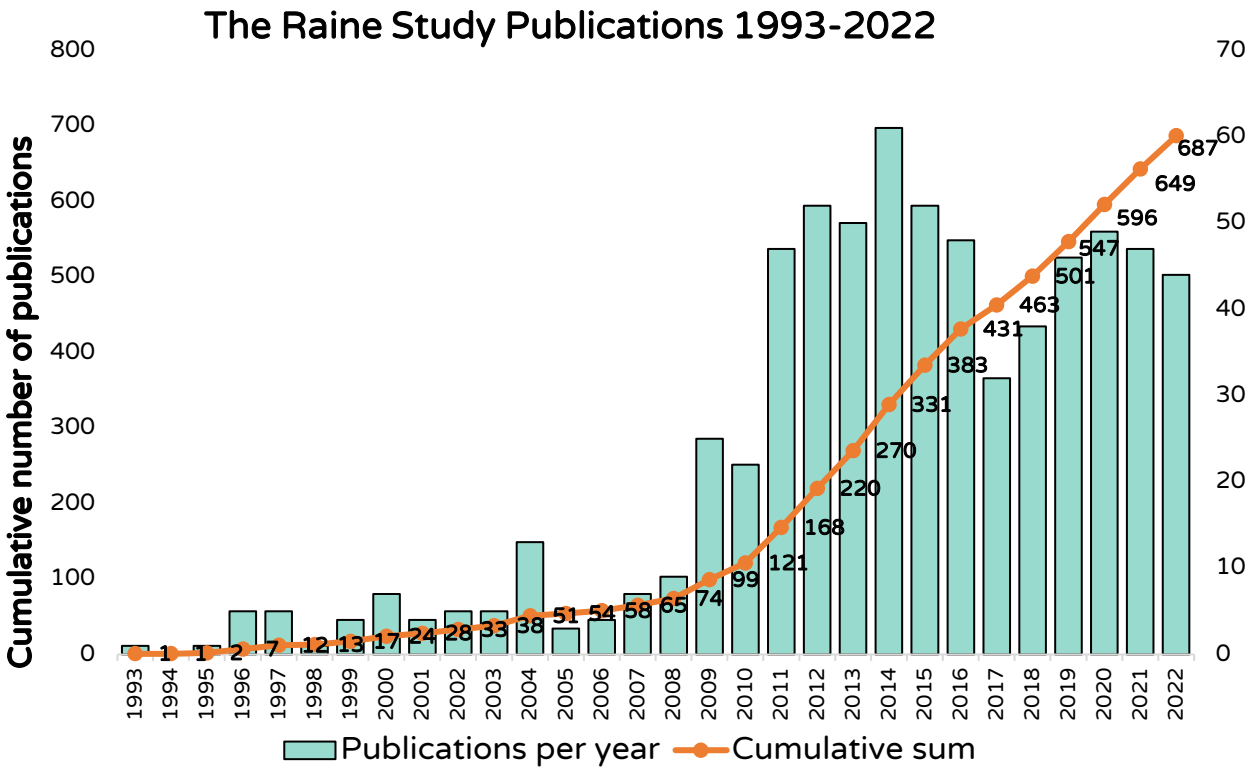


Figure 6. Number of Raine Study Publications by year (1993-2022)

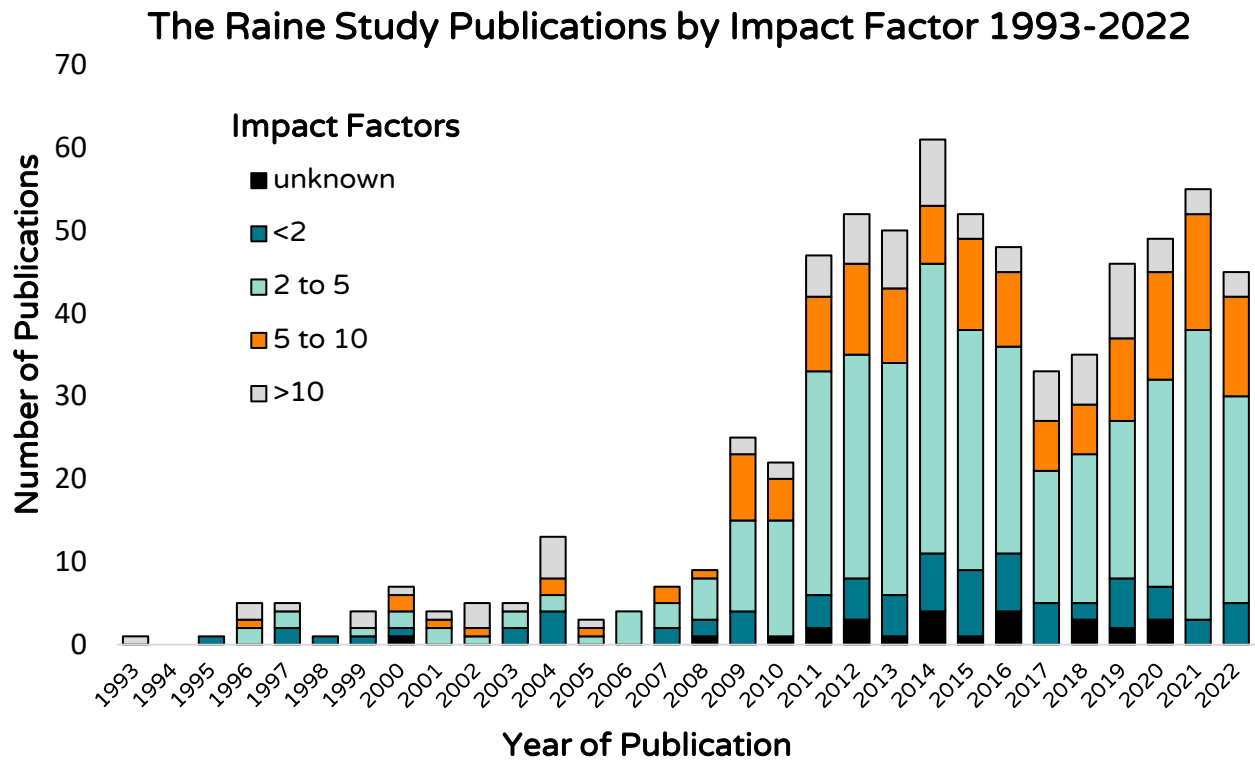


Figure 7. Number of Raine Study publications by year and impact factors

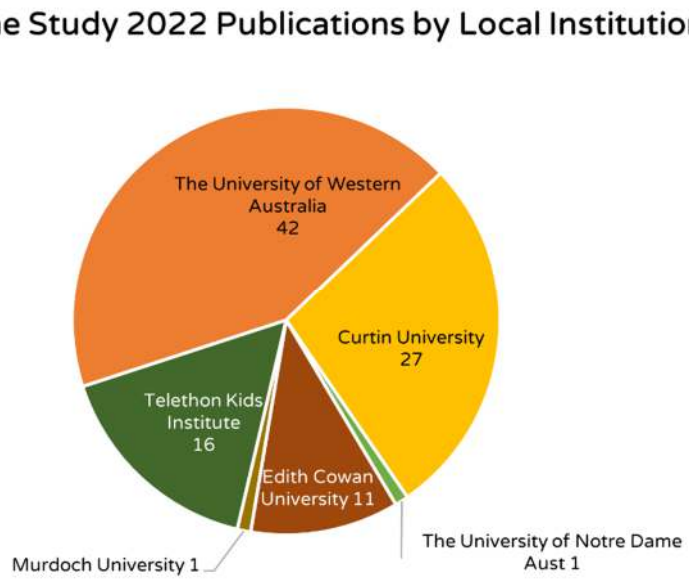


Figure 8. Number of Raine Study publications in 2022 by local institution

Communications and External Engagement

The main communications focus for 2022 was preparation for the Generations follow-up. This included communications to researchers about the opportunities available to them and the deadline for grant applications to fund their desired activity, and a full suite of communications to participants that the Generations follow-up was coming.

In the second half of 2022 the team had a specific focus on finding and re-engaging those participants who were "lost" to us, for whom we didn't have up to date contact information, or those who had stopped coming to assessments. Key deliverables included the "Lost Participants Toolkit", a suite of materials we shared with our known participants to encourage them to promote the Raine Study to their own networks whether via social media and email, or posters and flyers. We also did our first ever round of cinema advertising in support of finding these lost participants, with a spot booked to run in early 2023 at all locations of the very popular Telethon Community (outdoor) Cinemas in Perth.

Communications encompassed social media platforms with growth across all four platforms the Raine Study is active on (Facebook, Instagram, LinkedIn, and Twitter), newsletters and engagement with media to promote the Raine Study's ongoing achievements.

The communications team was proud to support 660 hours of communications internship opportunities through UWA's Work Integrated Learning program, as well as additional voluntary time from 6 of these 8 interns to support the Symposium event. Conversations have commenced about extending these internship opportunities to our other UJV partners. The interns completed activities designed to help tell the story of the Raine Study's impact, from plain language summaries of scientific publications to the creation of graphics, video and written content for the Raine Study's website and social media platforms.


Social Media

In 2022 we doubled down on building the Raine Study's presence with participants on Facebook and Instagram. We were rewarded with significant increases in audience numbers as well as engagement (likes and shares) as follows:

- Facebook: total cumulative audience of 9,135, increase of 225.4% cf 2021
- Instagram: total cumulative audience of 1,138, increase of 147.4% cf 2021

Our LinkedIn and Twitter presence saw more modest increases of audience. LinkedIn remains an important tool for reaching both researchers and our Gen2 participants. Twitter continues to be used by researchers, though the team will evaluate the value of a continued Twitter presence later in 2023.

Website

The team continued to make small updates to the look and feel of the Raine Study website, with the most changes coming to the home page as well as the pages in the For Participants section. Budget and time constraints proved the biggest challenges to making more sweeping changes to improve the functionality and useability of the website, which the team hopes to be able to address in greater depth in 2023.

Media Coverage

With the assistance of partner institutions and the strength of its research outcomes, the Raine Study was featured regularly in the mainstream media in 2022, which helped advance the Raine Study's overall storytelling goals in terms of participant engagement, research reputation, and sustainable future. Coverage included the following topics:

Participant engagement: The Raine Study's director was invited to take part in a live radio interview on 6PR (Perth)'s Weekend Mornings program to promote the upcoming Generations follow-up and encourage any lapsed participants to get back in touch.

Research reputation: A broad range of media coverage demonstrated the extent of research topics that Raine Study data could be applied to, from language development to fertility, which were widely promoted across mainstream media in Western Australia and nationally, in print, radio, TV and online. The expertise of the Raine Study's scientific staff in the field of big data was also highlighted via coverage in the University of Western Australia's Uniview Magazine.

The importance of philanthropy and partnerships were highlighted with in-depth feature stories about the Raine Study in the Stan Perron Charitable Foundation's in-house employee magazine Perron Way, Uniview Magazine, and INSPIRE Magazine (Research Australia).

Events

2022 Raine Study Symposium

In September, we held the 2022 Raine Study Symposium event, a reimagining of our Annual Scientific Meeting, intended to help us tell the whole story of the Raine Study. We showcased the breadth and depth of opportunities the Raine Study can offer researchers at all stages of their careers, from students and early career researchers to world-renowned experts in their field of endeavour. We celebrated the contributions of our participants, welcoming more than 75 participants of all ages to the event, and were privileged to hear their thoughts on the future direction of the Raine Study. The event also provided us with a platform to celebrate the value of partnerships with presentations from our oldest funding partner (the Raine Medical Research Foundation) as well as one of our newest (the Stan Perron Charitable Foundation).

Researcher Presentations at the 2022 Raine Study Symposium

Student presentations:

1. Yadav A, Mori TA, Beilin LJ, Huang RC, White S, Newnham J. Fetal growth trajectories and measures of insulin resistance and adiposity in young adults. Raine Study Symposium, Perth, 2 September 2022.
2. Kiconco S, Earnest A, Enticott J, Hart R, Mori TA, Hickey M, Teede HJ, Joham AE. Normative cut-offs for polycystic ovary syndrome (PCOS) diagnostic features in adolescents using cluster analysis. Longitudinal cardio-metabolic profiles in adolescents with and without Polycystic ovary Syndrome (PCOS). Raine Study Symposium, Perth, 2 September 2022.

3. Tan J, Ng C-A, Hart N, Rantalainen T, Sim M, Scott D, Zhu K, Chivers P. The way they move? Loading differences and bone health in adults with Developmental Coordination Disorder. Raine Study Symposium, Perth, 2 September 2022.
4. Sansom K, Eastwood P, McArdle N, Walsh J, Maddison K, Singh B, Reynolds A, Dhaliwal SS. Association between sleep irregularity, OSA and Hypertension in a middle-aged community population. Raine Study Symposium, Perth, 2 September 2022. ***WINNER – Raine Medical Research Foundation prize for Outstanding Oral Presentation by a Student Researcher.***
5. Wood N, O'Donnell A, Melton P, Huang R-C, Cohen-Woods S. Scars of Childhood Stress: Does DNA methylation mediate the relationship between childhood socioeconomic position and young adult depression symptoms? Raine Study Symposium, Perth, 2 September 2022.

Early career researcher presentations:

1. Yang J, Gwini SM, Beilin LJ, Schlaich M, Stowasser M, Young MJ, Fuller PJ, Mori TA. Effect of oral contraception on aldosterone, renin, aldosterone to renin ratio and blood pressure in young women: a 10-year longitudinal study. Raine Study Symposium, Perth, 2 September 2022. ***WINNER – Raine Medical Research Foundation prize for Outstanding Oral Presentation by an Early Career Researcher.***
2. Charng J, Ansari AS, Bondonno N, Hammond CJ, Hunter ML, Louca P, O'Sullivan T, Mackey D. Association between vitamin B3 intake and health of the inner retina. Raine Study Symposium, Perth, 2 September 2022.
3. Pretorius R, Huang R-C. Maternal diabetes in pregnancy and developmental programming of neurodevelopment disorders: An inflammatory Hypothesis. Raine Study Symposium, Perth, 2 September 2022.

Other Researcher Presentations in 2022 – National & International Events

1. Lee, S. Change in peripapillary retinal nerve fibre layer thickness from age 20 to 28 years old. Australia and New Zealand Glaucoma Society Virtual Meeting, February 2022

2. Lee, Samantha. Myopia incidence and progression between 20 and 28 years old. Royal Australia and New Zealand College of Ophthalmologists Meeting 2022. Virtual meeting, 26 February 2022.
3. Mackey, D. Prevalence and risk factors of myopia in young adults: review of findings from the Raine Study in Western Australia. Invited Visiting Professor. The University of Wisconsin-Madison Ophthalmology Department, Madison USA, 13 March 2022.
4. Foong, R. Prenatal exposure to plastic-derived chemicals has long-term respiratory effects. Thoracic Society of Australia and New Zealand Annual Scientific Meeting, 31 March 2022.
5. Richards, G., Tan, D. W., Whitehouse, A. J. O., McManus, I. C., Beaton, A. A., Hickey, M., Maybery, M. T., Licari, M. K., & Lawson, L. Poster: Perinatal testosterone, estradiol, and Vitamin D as predictors of human handedness. European Human Behaviour and Evolution Association Annual Conference, Leipzig, Germany (online). 19-22 April 2022
6. Lee, S. Poster: Change in peripapillary retinal nerve fibre layer thickness from age 20 to 28 years old. ARVO 2022; Denver Colorado (presented virtually), 1-7 May 2022
7. Lee, S. Poster: Myopia incidence and progression between 20 and 28 years old. Science on the Swan, Perth, 9-11 May 2022.
8. Lee, S. The rising prevalence of myopia (and what we're doing about it). Guest presentation at Kings College London, UK, 23 May 2022.
9. Calder, S., Brennan-Jones, C., Robinson, M., Whitehouse, A., Hill, E. The prevalence of Developmental Language Disorder at 10 years in the Raine Study. Speech Pathology Australia 2022 National Conference, Melbourne, Victoria. 23 May 2022.
10. Nakano, K. Hearing-related disorders in Western Australian young adults: prevalence and modifiable risk factors. Harry Perkins Institute of Medical Research / Australian Society for Medical Research (ASMR). 10 June 2022.
11. Lee JL, Yadav A, Mori T, Adams LA, Beilin LJ, McKinnon E, Olynyk J, Pennell C, Huang R-C, Ayonrinde OT. The relationship between foetal head circumference growth trajectories and nonalcoholic fatty liver disease in adolescents. 2022 European Association for the Study of Liver (EASL) Annual Liver Congress, London, UK, 22-26 June 2022.
12. Wijs, L. Asthma and allergies in a cohort of adolescents conceived after assisted reproductive technologies (ART). Annual Scientific Meeting of the European Society of Human Reproduction and Endocrinology (ESHRE). 5 July 2022.
13. Mackey, D. Distribution of axial length in Australians of different age groups and refractive errors. Invited Speaker. RANZCO Paediatric Special Interest Group, Brisbane Queensland, 9 July 2022.
14. Yadav A, Mori TA, Beilin LJ, Huang RC, Vlaskovsky P, Newnham J, White S. Fetal Growth Trajectories, and their association with Adiposity & Inflammation in Young Adulthood. DOHaD World Congress 2022, Vancouver, Canada, 27-31 August 2022.
15. Yadav A, Mori TA, Beilin LJ, Huang RC, Newnham J, White S. The relationship between fetal growth trajectories and measures of insulin resistance and waist-height ratio in young adults. DOHaD World Congress 2022, Vancouver Canada, 27-31 August 2022.
16. Mackey, D. Distribution of axial length in Australians of different age groups, ethnicities, and refractive errors. Invited speaker. International Myopia Conference 2022, Rotterdam, The Netherlands, 5 September 2022.
17. Ayonrinde O, Olynyk J, Hart R, Adams L, Beilin L, Mori T. NAFLD combined with PCOS in adolescents is associated with insulin resistance and atherogenic

dyslipidaemia during adulthood ten years later. European Association for the Study of the Liver NAFLD Summit 2022, Dublin, Ireland, 15–17 September 2022.
18. Calder, S., Brennan-Jones, C., Robinson, M., Whitehouse, A., Hill, E. Do parent reported early indicators predict later Developmental Language Disorder? A Raine Study investigation. International Developmental Language Disorder Research Conference, Virtual conference. 19-20 September 2022.
19. Mackey, D. What Raine Study tells us about myopia development. Invited speaker. 3rd Asia-Pacific Myopia Society Congress, online meeting, 24 September 2022.
20. Wijs L, Doherty D, Keelan, Hart, R. Long-term effects of IVF on the mental health of the offspring. American Society for Reproductive Medicine, Los Angeles, October 2022
21. Wan F, Feng P, Oyekoya A, Adams L, Mori T, Beilin L, O'Sullivan T, Olynyk J, Oddy W. Prospective dietary fatty acid intake is associated with trajectories of fatty liver disease: an 8-year follow-up study from adolescence to young adulthood. International Congress on Obesity, Melbourne, Australia, 18-22 October 2022.
22. Yadav A, Beilin L, Huang R-C, Newnham J, White S, Mori T. Relationship between fetal growth trajectories and measures of insulin resistance and adiposity in young adults. Royal Perth Hospital Research Foundation Research Symposium, Perth, Western Australia, 19 October 2022. ***Winner of the RPHRF Post-Graduate Research Award.***
23. Lee, S. Association of polygenic scores for glaucoma and its related phenotypes with measures of retinal ganglion cell integrity in young and older adults. Royal Australia and New Zealand College of Ophthalmologists Meeting 2022. Brisbane, 31 October 2022.
24. Yadav A, Beilin L, Huang R-C, Newnham J, White S, Mori T. Fetal growth trajectories and their association with an adult atherogenic lipid profile. Developmental Origins of Health and Disease, Australia and New Zealand, Adelaide, 10-11 November 2022.
25. Ribeiro FL, Ye X, Mori TA, Beilin LJ, Barth M, S Bollmann. Improving the robustness of deep learning segmentation models by analysing intensity distribution shifts between data sets. International Society of Magnetic Resonance in Medicine, Australian & New Zealand National Chapters 2022 Joint Meeting, Sydney, 12-13 November 2022.
26. Ye X, Ribeiro FL, Zhu X, Mori TA, Beilin LJ, Bollmann S. Interactive label generation – Using deep active learning for abdominal MRI organ segmentation with minimal training data. International Society of Magnetic Resonance in Medicine, Australian & New Zealand National Chapters 2022 Joint Meeting, Sydney, 12-13 November 2022.
27. Byg, L. The Role of Fetal Growth, Maternal Cortisol and Breastfeeding on Childhood Behaviour and Cardiometabolic Correlates in Adulthood. HMRI in Newcastle, NSW, confirmation hearing. 1 December 2022.

Researcher presentations not included in the 2021 Activity Report

1. Wijs, L. Poster presentation 'Offspring conceived through assisted reproductive technologies (ART) have normal thyroid function in adolescence.'77th Annual Scientific Meeting of the American Society for Reproductive Medicine (ASRM). 16-20 Oct 2021, Baltimore, Maryland, USA (online)
2. Wijs, L. Invited Oral presentation 'The long-term effects of assisted reproductive technologies on offspring.' Rising Stars Symposium of the Women and Infants Research Foundation (WIRF). 09 Sept 2021, Perth WA
3. Wijs, L. 37th Oral presentation 'Markers of cardiometabolic health of adolescents conceived through assisted reproductive technologies (ART) appear reassuring'.

Annual Scientific Meeting of the European Society of Human Reproduction and Endocrinology (ESHRE). 28 June 2021, (Virtual Annual Meeting)

4. Richards, G. Do prenatal testosterone and estradiol play a role in the development of human handedness?. Paper presented (online) at the Laterality Friday Seminar Series, University of Oslo, Norway. 27 August 2021
5. Richards, G. Prenatal sex hormones and human handedness. Paper presented (online) at the Centre for Behaviour and Evolution, Newcastle University, Newcastle upon Tyne, UK.13 July 2021.

Appendix: Publications list 2022

1. Alenezi EMA, Robinson M, Choi RSM, Veselinović T, Richmond PC, Eikelboom RH, et al. Long-term follow-up after recurrent otitis media and ventilation tube insertion: Hearing outcomes and middle-ear health at six years of age. International Journal of Pediatric Otorhinolaryngology. 2022;163.
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7. Calder SD, Brennan-Jones CG, Robinson M, Whitehouse A, Hill E. The prevalence of and potential risk factors for Developmental Language Disorder at 10 years in the Raine Study. Journal of Paediatrics and Child Health. 2022.
8. Catford SR, Halliday J, Lewis S, O'Bryan MK, Handelsman DJ, Hart RJ, et al. Reproductive function in men conceived with in vitro fertilization and intracytoplasmic sperm injection. Fertil Steril. 2022.
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11. Dry C, Pedretti MK, Nathan E, Dickinson JE. A comparison of four fetal biometry growth charts within an Australian obstetric population. Australas J Ultrasound Med. 2022;25(1):5-19.
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13. Duko B, Pereira G, Tait RJ, Betts K, Newnham J, Alati R. Prenatal alcohol and tobacco exposures and the risk of cannabis use in offspring: Findings from a population-based cohort study. Neurotoxicol Teratol. 2022;90:107064.
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15. Dyer KIC, Sanfilippo PG, Yazar S, Craig JE, Hewitt AW, Newnham JP, et al. The Relationship Between Fetal Growth and Retinal Nerve Fiber Layer Thickness in a Cohort of Young Adults. Translational Vision Science and Technology. 2022;11(7).
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"How do you conduct the best, largest, pre-birth longitudinal research study in the world, and yet still have participants feel like family? That's what the Raine Study means to me."

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We'd like to thank our partners for their *generous support*

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