

THE ORIGINS PROJECT

ANNUAL
PERFORMANCE
REPORT
2019-2020



originsproject.telethonkids.org.au



A HEALTHY START FOR A BETTER FUTURE

OUR VISION

Happy people building healthy communities across the planet that empower us to realise our **potential**.

PROJECT STRATEGIC IMPERATIVES

- Build a dynamic research platform to enable global health transformation (capacity)
- Provide responsive feedback to families and the community to facilitate change now (action)
- Collaborate globally and locally to extend our impact and reach (connectivity)
- Apply new technologies to accelerate and amplify change (creativity and ingenuity)
- Nurture and share a legacy that inspires global change growth sustainability and scalability (love, joy and awe)

ACKNOWLEDGEMENTS

We gratefully acknowledge that The ORIGINS Project is funded by the Paul Ramsay Foundation and the Commonwealth Government of Australia through the Channel 7 Telethon Trust.



The ORIGINS Project acknowledges the Aboriginal and Torres Strait Islander people as the Traditional Custodians of the land and waters of Australia. We also acknowledge the Nyoongar Wadjuk, Yawuru, Kariyarra and Kurna Elders, their people and their land upon which the Institute is located and seek their wisdom in our work to improve the health and development of all children.

CONTENTS

What is The ORIGINS Project?	02
Aims of ORIGINS	03
2019-2020 Snapshot	04
From the ORIGINS Directors	06
Meeting the Challenge of Uncertain Times	08
Project Implementation	10
Participant Engagement	12
The ORIGINS Timepoints	15
ORIGINS Biobank	16
ORIGINS Databank	18
Cohort Profile	20
Project Governance	22
ORIGINS Research & Sub-Projects	24
ORIGINS Research Dissemination	28
Research Translation	30
Real Time Feedback	32
COVID-19 Research Projects Within ORIGINS	34
Shareholder & Community Engagement	36
ORIGINS Staff, Volunteers & Students	38
Project Opportunities	40
Appendix 1: Active ORIGINS Sub-Projects	42
Appendix 2: ORIGINS Sub-Projects in the Pipeline	46
• ORIGINS Sub-Projects in the Pipeline: in Detail	48
Appendix 3: Stakeholder Engagement	52
Appendix 4: Research Dissemination	54
Appendix 5: ORIGINS in the Media	58

REPORT COMPILED BY

Co-Directors – Professor Susan Prescott and Professor Desiree Silva | Program Manager – Jacqueline Davis | The ORIGINS Project Team

We appreciate the artwork for The ORIGINS Project provided by Professor Susan Prescott. Susan is a passionate advocate for social change and adopting a holistic approach to life. As an artist she communicates these ideas, not only through the knowledge base of science, but also through the inspiration of art.

WHAT IS THE ORIGINS PROJECT?

The largest study of its kind in Australia, The ORIGINS Project (“ORIGINS”) is a partnership between the Telethon Kids Institute and the Joondalup Health Campus, aimed at reducing the rising epidemic of non-communicable diseases by providing a healthy start to life.

ORIGINS researchers are collecting detailed information about babies and their families to understand more about how the early environment influences the risk of diseases and the optimal time for interventions for early detection and prevention.

At its core, ORIGINS aims to improve the health and quality of life of the next generation through improved pathways to optimise the early environment and reduce adversity. This dynamic, interactive community-based project provides novel research capacity, productivity, collaboration and translational impact for future generations. Additionally, it is anticipated to have flow on benefits for community engagement, cohesion and purpose.

The ORIGINS Project is a catalyst for change, intervening as soon as anomalies are detected by referring participant families to appropriate community and health services. Not only does the project provide a framework for new discoveries, it is also a facilitator of collaboration across disciplines, sectors and communities. The potential for manifold benefits are endless.

This Annual Performance Report outlines the progress made and deliverables achieved during the reporting period 1st July 2019 to 30th June 2020. It includes key achievements; key challenges across the project; and identifies opportunities for 2020-21.

The ORIGINS Project is collecting detailed information on how a child’s early environment and parents’ physical health and genetics influence the risk of a wide range of diseases and conditions such as asthma, eczema, food allergies, mental health, diabetes, obesity and autism.



AIMS OF ORIGINS

ORIGINS will create comprehensive data and biobanks for 10,000 families over the period of antenatal care, to five years of age. Using new science and technologies, the project will collect and analyse the data and specimens to answer a range of critical research questions.

ORIGINS aims to:

1. Improve the health of the next generation through optimising the early environment (on all levels), early identification and timely intervention

3. Make change: harmonised **nested interventions** clinical trials community-based programs

5. Utilise new technology platforms for personalised medicine: examine complex biological interactions (P4 'omics) in relation to bio-psycho-social determinants

7. Collaborate closely with other national and international cohort studies



2019-2020 SNAPSHOT



The Biobank currently contains approximately **170,000** samples, estimated to grow to **700,000** individual samples by 2027

15 active ORIGINS Research Interest Groups have been launched to facilitate collaboration, provide expertise, develop sub-projects, and support students.

- Over 190 Research Interest Group members
- Members include researchers, clinicians, community members, service providers and educators



ORIGINS has strong links with **34** research groups / academic institutions, **19** service provider organisations & **10** community groups

2 undergraduate students, **3** MD students, **1** Masters student, and **11** PhD candidates involved with The ORIGINS Project or sub-projects in 2019-20

19 sub-projects

are nested within the core project, looking at multiple aspects of child and family health and development

18,000 jars of stools and over 50 litres of urine have been collected in the Biobank



The Biobank has tissue stored from over **800** placentas

Media coverage included more than 40 articles, radio/tv interviews and social media posts reaching an audience of **more than two million** people

To date, **48%** of the cohort have had an issue identified through real-time feedback and a management plan provided

The ORIGINS Databank has a total of **11,039,625** datapoints to date and increasing daily





A pandemic interrupts. ORIGINS' response to COVID-19 was swift:

Two COVID-related projects commenced within ORIGINS, and a new Research Interest Group was established

Blood samples in the antenatal period exceed 1,000 aliquots

43 research papers have been published linked to data and knowledge within the project

Researchers have presented at more than 34 conferences and community events



The ORIGINS Community Facebook Group was launched; an exclusive group for ORIGINS families to connect with each other. 60 members

Most common issues discussed with Child Health Nurse at Coffee & Connect;

- Speech delay
- Challenging behaviours/ socialisation
- Breastfeeding and milk supply
- Growth and development
- Maternal mental health/self-care

2020-2021 OPPORTUNITIES



- All ORIGINS data will be migrated to a new Data Hub Platform, under development by the Teletthon Kids Institute.
- ORIGINS will continue to increase the diversity of the cohort by targeting disadvantaged and vulnerable groups in identified geographical regions of high need.
- Knowledge Translation Network to be set up with state-based and national cohorts.
- 2021 ORIGINS Forum to be held in September 2021 to showcase ORIGINS research.
- Deliver a Priority Setting Workshop with consumers and other key stakeholders.
- Increasing focus on nature connectedness.
- Research translation to change in practice and policy including embedding of E-Health (PLAN) into routine clinical practice pathways to provide and support a healthy start to life.



The ORIGINS Project has engagement with over 500 researchers from around the world

Local Child Health Nurses started attending Coffee & Connect sessions this year to offer free advice to new and expectant families

FROM THE ORIGINS DIRECTORS

It has been another remarkable year for The ORIGINS Project. Despite global challenges that we are all facing, ORIGINS continued to operate.

The commitment from the Paul Ramsay Foundation and Commonwealth Government, in entrusting their financial investment in this project is continually valued and appreciated.

To our 6,000 participants, including over 3,500 mothers, 1,000 fathers and more than 2,500 ORIGINS babies, we start by saying thank you. Without our families, there would be no ORIGINS and we value you, your time and your commitment to local research that is having a global impact. We are currently in our third year of The ORIGINS Project, which we refer to as phase 2, where we are 'Strengthening the Foundations' of ORIGINS.

STRENGTHENING THE FOUNDATIONS

Over the three years of phase 2, into 2021, we work to increase engagement with, and diversity of, our families and ensure we retain our participants, as well as assess and ensure continual development and improvement of the project and its processes. All while continuing and expanding the research that is taking place. Building partnerships – new and old – is also a priority for the project in this phase.

The primary objective of ORIGINS is to explore novel perspectives on promoting a 'healthy start to life,' to build the foundations for a happy and healthy pathway into adulthood.

There is a sense of wonder and curiosity, as well as a determination to create positive change, that underpins ORIGINS. We aim to help the next generation become happy people, building healthy communities across the planet that empower us to realise our potential.

To achieve this we must continue to work with our families and our collaborators to sustain the largest study of its kind in Australia, providing the research community with a rich resource for exploration of the environmental and genetic factors that affect a person's health and development. Through translation of our research, we aim to inform policy and practices that will provide a better life for future





generations. Research translation has always been a focus for the project and we are seeing the impact we are having on our families, as they grow with us on the ORIGINS journey.

COVID-19

COVID-19 created a pause in our year, but we are proud of how our team and our participants have responded. The ORIGINS Project rose to the challenge to find new and innovative ways of keeping our families engaged, samples collected and ensuring the project could continue, in a slightly reduced capacity. ORIGINS staff very quickly moved through the informally self-titled 'Operation Hibernation' into 'Operation Adaptation' with a sense of determination.

See Susan's reflection on page 8 for how ORIGINS rose to the challenge of the pandemic and what it might mean for communities, including our cohort, going forward.

MONITORING LONG-TERM IMPLICATIONS

It is anticipated that there will be many changes in the community's behaviour following the pandemic and long-term implications for health, and ORIGINS will be able to monitor this. For example, technology has been a great resource for many to stay connected during isolation, but it will now be necessary to monitor if there will be lasting changes from this technology use.

Even before the pandemic Aussie kids were 82% less likely to play outside than previous generations, with implications for mental and physical health, microbiome, performance and behaviour. For some, isolation has already promoted a newfound appreciation and desire for nature. ORIGINS hopes to encourage this, but it could go the other way, and

ORIGINS will be actively monitoring attitudes and behaviour in the coming years.

A HEALTHIER, MORE RESILIENT FUTURE

From the beginning ORIGINS has been framed as "a local project with global vision", that is more important now than ever. For ORIGINS, the future is about finding new hope and purpose, vibrant communities, opportunity and equity, social and environmental justice as part of healthier sustainable economies. To shift the collective health trajectory, it is vital to address the broken systems that created the interdependent problems in the first place. Changing attitudes can change actions, behaviours and even systems—as a gateway to a healthier more resilient future.

ENGAGEMENT WITH OUR FAMILIES

We were disappointed that we did not have the opportunity to catch up with our families at our annual Family Day event, which was scheduled for April and had to be cancelled due to the pandemic. We enjoy connecting with our families and seeing our ORIGINS children grow and develop. It is also unfortunate that our Coffee & Connect drop-in sessions have had to be put on hold for the time being.

Despite the pandemic, we have been able to continue to follow our families, as infants reach the one-year and three-year milestones, with in-person visits when possible. We have continued to provide real-time feedback to every family that completes these assessments. Notably, a significant number have benefited from specific advice and/or early referrals, mainly for early detection of allergies, developmental or behavioural issues, childhood growth concerns, or other medical issues that were newly identified because of the visit. This has revealed how important these assessments are, and how much they are appreciated by our participants.

INCREASING DIVERSITY OF OUR COHORT

The project aspires to ensure access to ORIGINS is equitable for the whole community and that research interventions should be accessible to all. This coming year, we are looking to ensure that we reach those in our community that are most vulnerable and could greatly benefit from involvement in the project, that we are not currently capturing. We will look to better engage families experiencing challenges, such as low-income, culturally and linguistically diverse families and Aboriginal and Torres Strait Islander families, as well as those who are developmentally vulnerable.

BUILDING PARTNERSHIPS

We continue to work closely within existing and newly established partnerships that allow us to spread our reach a little further, to achieve more and to learn from each other. The project's growing reputation and influence allows us to develop opportunities, building an extensive collaborative network with researchers and organisations from diverse fields across the world.

Our local collaborations, however, are our most important and we acknowledge the support and dedication of the Telethon Kids Institute and Joondalup Health Campus. Both organisations are entrenched in our activities and processes.

We hope that our participants, collaborators and fellow researchers are also benefitting from all that The ORIGINS Project has achieved over the last year, and along its three-year journey so far.

We present to you this report that highlights our proudest achievements and the challenges we faced throughout 2019 and 2020.

MEETING THE CHALLENGE OF UNCERTAIN TIMES

A reflection on COVID-19 and ORIGINS
by Professor Susan Prescott.

The latter few months have been a time of profound and sudden large-scale change. Although this challenging time has touched all of us, it has also taught us many things.

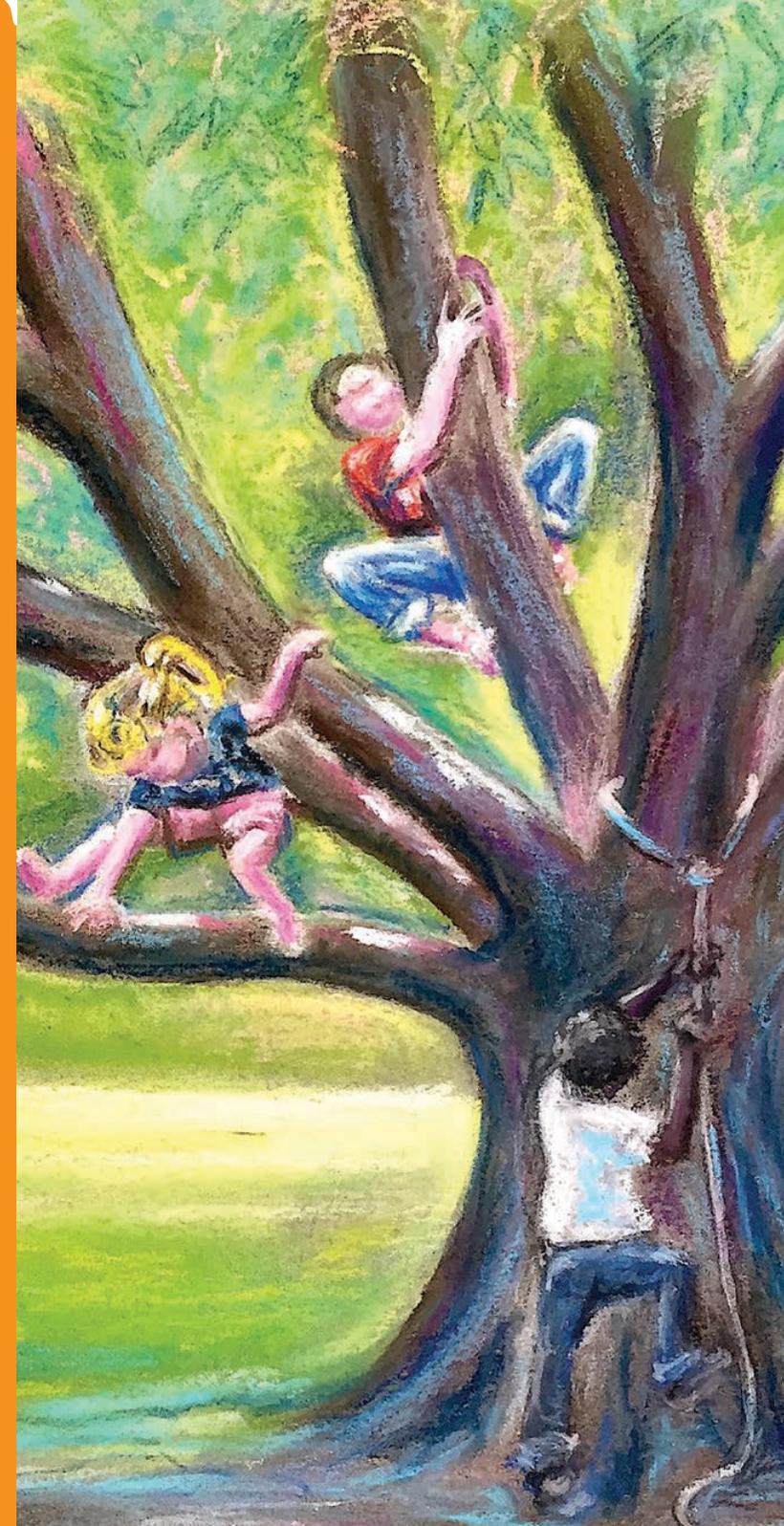
As well as our vulnerabilities, it has revealed many strengths, as so many in our community have rallied in new and creative ways to support each other. In particular, it has been amazing and inspiring to see how well and how quickly the ORIGINS community has adapted. We are incredibly proud of our participants, volunteers, staff and research collaborators for the way they have responded in the crisis.

The pandemic has brought home just how personal planetary health can be, and how projects like ORIGINS are important in contributing to the wider global agenda—highlighting the interconnections between the health and resilience of people, place and planet. Although we are

fortunate that Australia has been spared the level of COVID-19 infection seen in many parts of the world, we have been impacted in other ways. This includes the personal, social and economic costs that disproportionately affect the most disadvantaged families of our community—those who are least equipped to deal with this.

Addressing inequities

Addressing these inequities of the most disadvantaged families in our community is a major goal of The ORIGINS Project going forward, as we continue to strive to reduce the rising global burden of non-communicable diseases (NCDs) through a healthy start to life. Importantly, data emerging from overseas has highlighted that pre-existing NCDs are a specific risk factor for COVID-19, and one reason for the increased vulnerability of large proportions of many populations.





The ‘pandemic’ of non-communicable diseases

For decades, human health has been under threat from this mounting “pandemic” of non-communicable diseases- largely the result of adverse environments and lifestyle behaviour—beginning in early life. Although this “crisis in slow motion” has been responsible for vastly more deaths and disease than infectious disease, it has unfortunately not galvanized the same coordinated global efforts for prevention, as we are currently seeing with more imminent acute infectious threats, such as COVID-19.

However, given that infectious outbreaks are also inter-related to the same disruptions in planetary health, and that individuals with pre-existing NCDs are far more susceptible to infections such as COVID-19, it is imperative to take a more integrated, cross-sectoral approach to health. ORIGINS is poised to contribute to this through new evidence, intervention and advocacy.

Post-COVID and our microbiome

Another related post-COVID concern is the increasing use of detergents and disinfectants during critical early periods of development. We already know that our immune development is dependent on diverse early microbial exposure, and this has implications for long term immune, metabolic and even mental health. Overcoming fear of microbes and convincing our children it is safe outside, may be a greater challenge in the “post-COVID world”. We already know that avoiding microbes is not a health solution—but is actually implicated in the rising rates of allergy, obesity and mental health problems. We believe it will be even more important for healthcare professionals to promote the health benefits of nature—to increase direct, personal contact with biodiversity for physical and mental health benefits, and for skin and gut microbiome and immune function. There are also beneficial effects on health behaviours—such as



We should never underestimate the importance of grassroots effort towards change, and the role of community projects, like ORIGINS, in every community. As individuals, we must believe our actions can make a difference to make meaningful change. We need tangible pathways to engage—and that is exactly what community projects do.



food choices, sleep, and physical activity—that also favourably impact immune function. Moreover, increasing nature connectedness promotes environmental responsibility and value systems that are geared to restoring and preserving biodiversity.

The role of community projects

These are among the many questions that we hope ORIGINS will be able to address in partnership with our community. And we continue to invite new ideas.

We should never underestimate the importance of grassroots effort towards change, and the role of community projects, like ORIGINS, in every community. As individuals, we must believe our actions can make a difference to make meaningful change. We need tangible pathways to engage—and that is exactly what community projects do. They also promote cross-sectoral engagement between the public, science, industry, and government, increasing optimism, shared vision and creativity.

We hope that ORIGINS will continue to provide an example for other communities. As such, we are leading international efforts to link cohorts and community activities around the world, through inVIVO Planetary Health. This recognizes the value of conductivity in contributing to new normative values.

The opportunity of the global pause

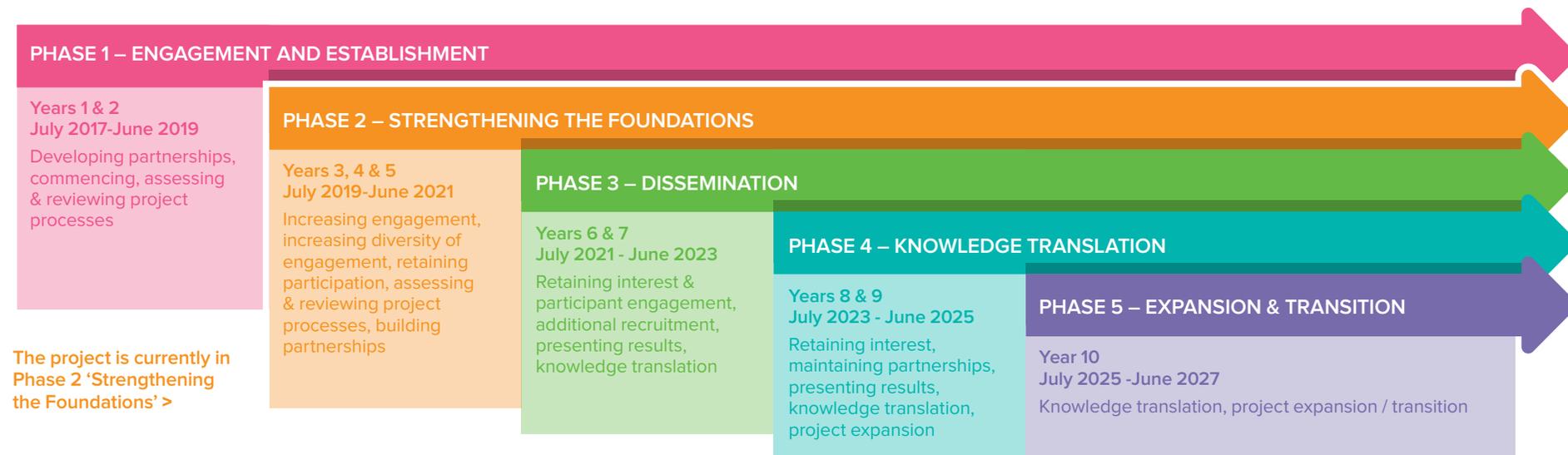
For all of us, this “global pause” has been a time to reassess priorities. An opportunity to change the way we live on the “other side”, both personally and collectively. COVID-19 has been in many ways a global tipping point. The economic fallout alone means that we can’t simply return to where we were. Restoring resilience after a pandemic should not simply aim restore the status quo. We hope that this crisis will provide opportunities for more unified agendas as we reassess collective values, priorities, our sense of self and community.

PROJECT IMPLEMENTATION

The project provides a framework for strategic long-term research capacity with global application. Implementation of the ORIGINS Project is separated into five phases. Each phase has a central focus which will shift and adapt as the project grows.

The project is currently in Phase 2 '*Strengthening the Foundations*', where the team will seek to increase the diversity of engagement, refine processes and continue to build partnerships. Continual review and improvement is a priority for ORIGINS.

ORIGINS Phases of Implementation



The project is currently in Phase 2 '*Strengthening the Foundations*' >



JAMEE'S STORY

People often ask me why I decided to join The ORIGINS Project. I always answer, why not?

The more we get involved and find out about ORIGINS, the more worthwhile it becomes. What we are changing might not only be for me, but is for my grandkids, and if I can look back and realise we made a difference for the positive, I know this has been for something.

I always feel appreciative of the extra mile the staff go to accommodate the participants. Whether it's holding a Coffee & Connect session with staff and health nurses, having an ear to listen when things aren't always going the right way, and always changing surveys to suit us - it is more of a community group than a study.

The best thing about ORIGINS is definitely Coffee & Connect sessions, as it allows us to chat to other parents and have more support (which as a mum you can always have more of). We also get all the tests that you wouldn't normally receive. Having piece of mind knowing that my child is being looked after by the ORIGINS team, and ensuring her growth and development is on track, is a relief.

The only downfall with ORIGINS is that there are so many amazing new studies coming through, that you have me almost convinced to have a 4th child to keep being a part of it.

Jamee Brien – ORIGINS Mum



Jamee with her family. ORIGINS child, Chelsea, is pictured far right.



PARTICIPANT ENGAGEMENT

ORIGINS is an observational and interventional pregnancy cohort study.

Pregnant women (and the father of their baby and/or partner) are recruited with informed consent early in their pregnancy to collect detailed environmental and psychosocial data using questionnaire data, medical records, diagnostic tools and biological samples.

The data forms the ORIGINS research platform (biobank and databank) will be available to researchers, to assess how these early life exposures influence a child's growth, development and health (including neurodevelopment, evidence of allergies, infections, and other medical and mental health conditions).

The families will initially be followed up until the child is five years of age. The aim is to recruit 5,000 'Active' participants (undertaking deep sampling at specific time points) plus 5,000 'Non-Active' participants that includes all routinely collected hospital data, opportunistic samples and linkage to government and non-government databases.



KEY ACHIEVEMENTS

In total, The ORIGINS Project has recruited 3,610 participants (pregnant women) at the end of June 2020. This is in line with our project deliverables at 84% of projected target numbers (4,305) by end of June 2020.

Additionally, the total number of ORIGINS babies is 2,769 and ORIGINS participant fathers/partners 1,229 at the end of June 2020.

Participant Recruitment and Follow-up

RECRUITMENT & FOLLOW UP NUMBERS	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL IN REPORTING PERIOD	PROJECT CUMULATIVE TOTAL
Participants Enrolled (A)*	70	67	50	69	76	32	72	47	39	63	57	61	703	2133
Participants Enrolled (N-A)**	70	39	41	52	72	47	77	92	51	65	65	108	779	1477
Total participants recruited													1,482	3,610
Babies consented (A)*	42	50	73	56	53	60	66	55	51	52	43	36	583	1,625
Babies consented (N-A)**	67	49	53	47	59	54	80	93	56	77	72	93	736	1,144
Total babies consented													1,319	2,769
Fathers Enrolled (A)	55	43	42	39	48	43	68	67	39	15	18	50	527	1,229
Total fathers recruited														1,229
One-year infant*** appointments	36	30	17	41	39	34	29	35	24	48	29	36	398	485
Actuals expected***	37	50	44	61	40	37	45	30	49	44	46	43	Within 80% of expected targets	
Total one-year clinic appointments														439
Three-year child++ appointments	Na	Na	Na	Na	Na	Na	4	10	10	8	20	14	65	65
Actuals expected ++	Na	Na	Na	Na	Na	Na	12	9	29	18	30	37	Within 65% of expected targets	
Total three -year clinic appointments														65
Total number of participants who asked to be withdrawn from The ORIGINS project between June 2019 – June 2020 was 34														55

*Active (deep sampling) participants.

**Non-Active (routine data only) participants.

***One-year infant includes children between 12-18 months; therefore, the cumulative total of one-year infant appointments will increase in future reporting periods as babies reach the 12-18-month mark.

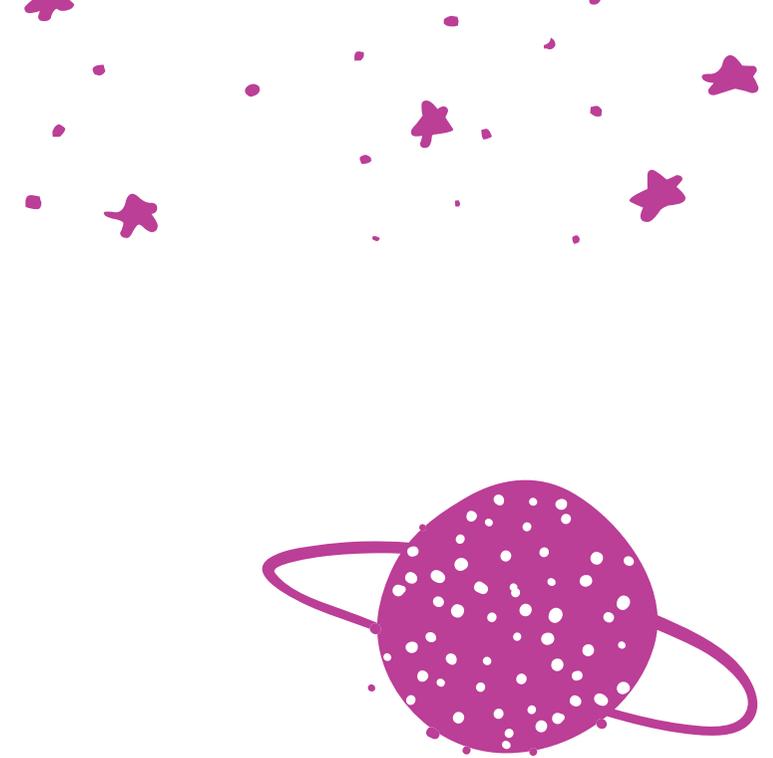
++ Three-year child appointments includes children between 3yrs-3.5yrs; therefore the cumulative total of child appointments will increase in future reporting periods as children reach the 3-3.5yr mark. Note. Three-year child appointments did not commence until January 2020 (Na).

PARTICIPANT RECRUITMENT AND RETENTION

- Recruitment rates are consistent with numbers in 2018/2019 although our projected totals remain lower than anticipated during the reporting period. This is due to multiple factors, predominantly effects of the COVID -19 pandemic, reduced births at JHC and the relocation of private obstetrics to St John of God Hospital, Subiaco.
- Conversion rates to ORIGINS participants from screened women birthing at JHC have remained steady on average at 60% per month, with an increase up to 80% since January 2020.
- Ongoing recruitment has also occurred directly from Perth Pregnancy Centre (PPC), community-based public antenatal clinic.
- In January 2020, the three-year old clinic appointments commenced. These include paediatric allergy testing and body composition measurement appointments.
- 19 nested studies (sub-projects) are now actively recruiting and 59% of ORIGINS participants are enrolled in one or more.
- In March 2020, The ORIGINS Project Quality Assurance Task Force was established to ensure integrity, accountability, and transparency throughout the project. This internal group will review all processes, help develop measurable outcomes and create reports on how to improve service delivery and minimise risk.
- A working group party with stakeholders from various departments at JHC was established in May 2020. This group meets monthly to review and discuss new and existing ideas and find workable solutions to implement seamless delivery throughout the project.

NEW STRATEGIES IMPLEMENTED TO RECRUIT AND RETAIN PARTICIPANTS

- In consideration of potential participant burden, communications, sampling and questionnaire time points have been streamlined across ORIGINS. As part of this streamlining, participant engagement phone calls have been implemented at 6 months, 18 months and 2.5 years.
- Telehealth appointments implemented during the COVID-19 pandemic were seen as a huge benefit to participants with feedback suggesting it is a helpful as an option for convenience/time saving / childcare.
- E-consent capabilities were developed for all levels of ORIGINS participation and some sub-projects.
- A stronger collaboration with JHC maternity department staff has been established to provide on-site support, including the introduction of a shared resource to commence screening calls on behalf of the project.

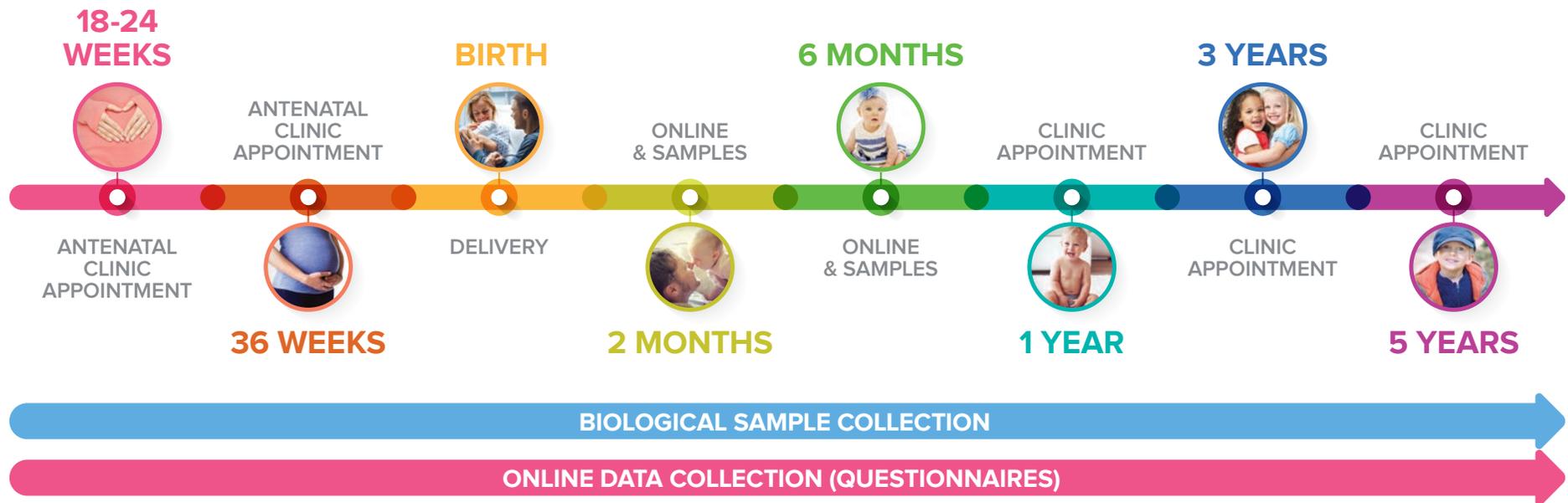




ORIGINS TIMEPOINTS



The ORIGINS Project is collecting data from multiple sources from the mother, infant (and father/partner) at multiple timepoints from gestation through to five years of age.



ORIGINS BIOBANK

The ORIGINS Biobank is collecting biological samples from participant families at 10 timepoints between the time of pregnancy and the child turning 5 years of age.

The Biobank currently contains approximately 170,000 samples and this will continue to grow to an estimated 700,000 individual samples by 2027.

The samples and derived data from future 'omics analyses is likely to be one of the largest collections in Australia and is receiving national and international interest.

KEY ACTIVITIES

- **Software:** One of the biggest achievements of 2019/2020 has been the implementation of the Laboratory Information Management System (LIMS) OpenSpecimen, which was purchased at the end of 2018 to improve sample tracking. The software has been customised to ORIGINS and the legacy data migration is now complete.
- **Sample collections:** The Biobank continues to collect antenatal samples from around 80% of participants, birth samples from around 75%, and blood collections from infants and children are successful in approximately 50% of participants.
- **Sample usage:** Some sub-projects have reached sample analysis stages and the release of several sample sets have been approved; one project has already released samples for analysis, with more releases planned in coming months.

- **Postnatal samples:** Home collection continues to present a challenge as maternal motivation is often lower in this period. To counteract this, participant engagement has been increased, including voucher incentives and courier collections from the participants' homes which have had a positive impact.
- **Quality Control:** New checking procedures have confirmed several sample types to be of high quality, with more to be investigated in coming months. Sample limitations are also being investigated and will guide appropriate use of samples in the future.
- **The ORIGINS Biobank Governance Committee:** Continues to oversee and advise on the processes, quality standards and risks of the ORIGINS Biobank.
- **Biobanking networks:** A positive relationship is being maintained with the Australasian Biospecimen Network Association (ABNA). The ORIGINS Biobank Manager is an ABNA committee representative and was the head of the conference committee planning the 2020 ABNA conference in Perth. However due to COVID-19, the 2020 Perth conference has been delayed till 2021. There are plans to extend the ABNA relationships to the international biobanking network International Society for Biological and Environmental Repositories.






The ORIGINS team collect biological samples from our Mums, Dads and babies at several timepoints from pregnancy to 5 years of age. We store them in special freezers and call them our Biobank.

Here are some **FUN FACTS** about our Biobank collections so far:

Sample type	What can we learn from the sample?	Volume currently	Equivalent
 Saliva	1 measure levels of antibodies, stress hormones, bacteria. Obtain DNA.	5 litres	<i>That's 2 full very large jugs</i>
 Stool (i.e. poo)	1 examine the presence and types of bacteria in a person's gut. The patterns of 'friendly bacteria' in our gut have a strong influence on our health.	Approx. 3,900 stool samples	<i>12,000 jars of poo</i>
 Blood	1 monitor metabolism, immune function and obtain DNA	4,000 blood draws	<i>Over 100 litres of blood (Lucky our nurses aren't scared of needles!)</i>
 House dust	1 measure allergen and environmental contaminant levels, as well as bacteria, which might influence the developing immune system.	A bathtub full of dust	<i>If that doesn't make you sneeze, nothing will!</i>
 Hair	1 measure stress and other hormone levels.	We take samples from all our participant Mums & Dads	<i>If we lined up all our collected hair samples, we would have over 100 metres of hair</i>
 Placenta	1 used to measure the activity of genes that might be altered by the early environment.	600 placentas = 350kg!	<i>That's 4 baby elephants (though we only keep a small part of the placentas in our freezers)</i>
 Urine	1 measure products of metabolism. 2 Even the healthy chemical products of friendly bacteria, living in our gut, can be looked at in our urine.	Over 40 litres	<i>Enough to fill a large aquarium</i>



KEY CHALLENGES AND STRATEGIES TO ADDRESS THEM

- **COVID-19:** The pandemic presented a major challenge for the biobank from early March 2020. While the laboratory facilities remained functional, the collection of biological samples was significantly compromised as social distancing prevented direct contact with participants. Participants were welcoming of the study contact and good rates of breastmilk, urine and stool collections were maintained during this time. Conversely blood, saliva and buccal collections could not be navigated in this period and were temporarily halted until mid-May 2020 after which collections were slowly re-introduced as social distancing restrictions eased.
- **COVID samples:** All samples collected in the COVID-19 period will be labelled as potentially bio-hazardous and will present a challenge going forward, as restrictions will apply on their usage due to possible virus carriage.
- **Cord blood sample quality:** Achieving and maintaining high rates of quality cord blood collection is an ongoing challenge and requires continual training and monitoring of clinical staff. E-newsletters are issued, JHC hospital in-service education sessions are held, and interaction with the clinical staff is encouraged at all opportunities to optimise engagement and compliance.



Bec's ORIGINS child, Jacinta.

BEC'S STORY

I love being a part of The ORIGINS Project as I feel I am giving back to the community. I feel part of a large family with the same ambition of making a difference for future generations.

Networking with other families at the Coffee & Connect sessions is a great way to relieve stress and calm anxiety by knowing we aren't alone with the challenges of parenting. Having the opportunity to speak with the ORIGINS team and doctors is such a great source of information. Having that in an informal setting is extremely beneficial too.

I love being a part of it all. I get more out of it than the time and effort required from me.

Rebecca Taylor – ORIGINS Mum

ORIGINS DATABANK

ORIGINS is collecting physiological, biological and clinical data from the mother, father and child at numerous time points to track development and change.

A critical element of data management is the ability to link the data sets. The potential richness of information from the curation of this comprehensive, longitudinal databank collection is immense.

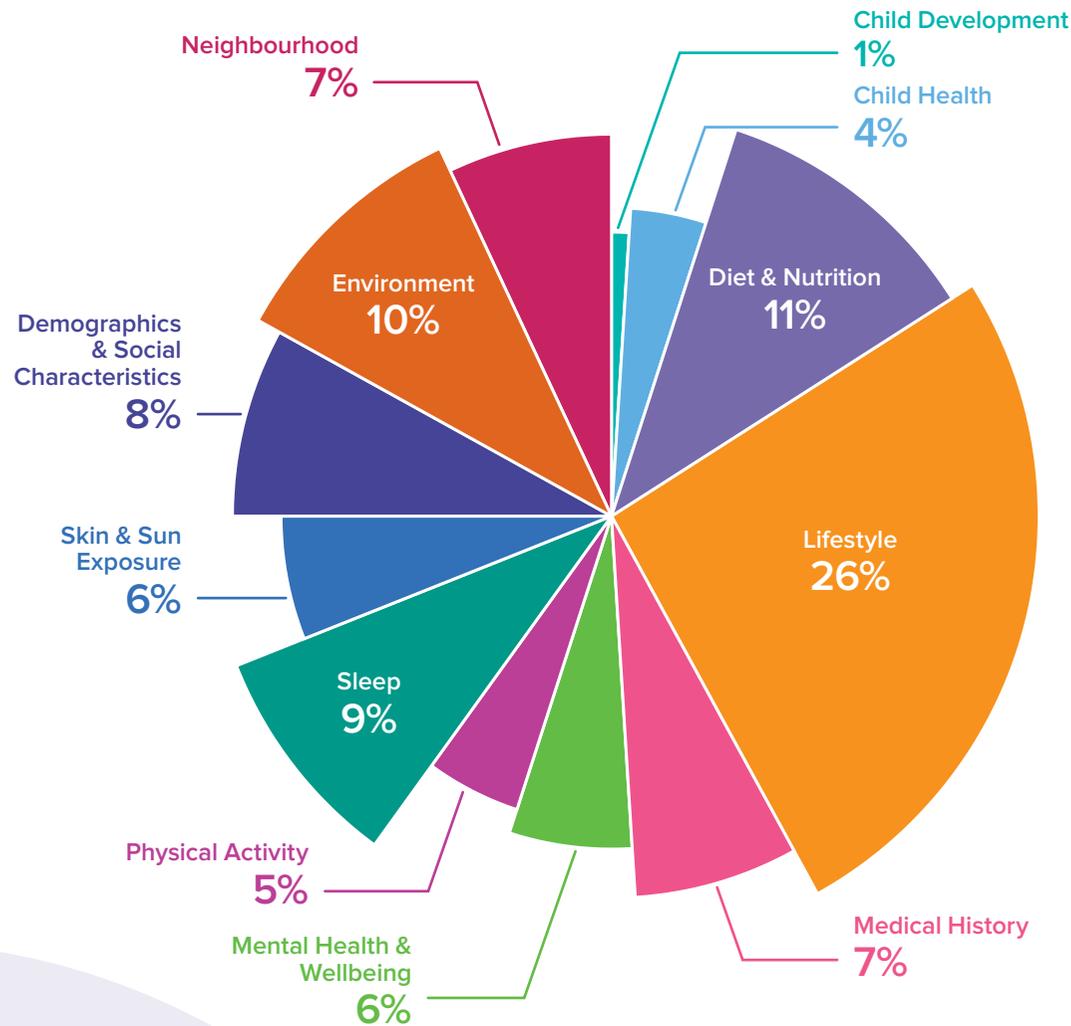
ORIGINS DATA SOURCES

The ORIGINS Project collects participant data from online systems, as well as via existing routinely collected data through Joondalup Health Campus and health service providers. Data is collected from a range of research domains (see chart on page 19). Data derived from samples ('omics data such as metabolomics, transcriptomics, proteomics) and microbiome analyses will need supercomputing storage capabilities. All data is linked through unique identifiers in order to track individual participants as well as family units.

KEY ACTIVITIES IN REPORTING PERIOD

- This year saw a significant improvement in the completion of questionnaires by participants. In fact, a 45% overall improvement in data obligation compliance was achieved in the period from December 2019 to April 2020 compared to the period July 2019 to November 2019. This was due to the following project initiatives:
 - **The introduction of the more user-friendly RedCap platform for core surveys.** This program also provides increased back-end functionality, to give staff participant management tools that allow tracking and support.
 - **Centralised participant reminder system:** email, SMS and phone contact points overlaid across systems and timepoints to achieve an improvement in participant survey completions.
 - **Australian Eating Survey (AES) upgrade:** Migrated to a new platform in June 2020 to address low participant completion rates.
 - **Ages & Stages Questionnaire (ASQ) workflow improvements:** new workflows and security measures were implemented to facilitate communication with participants regarding the paediatric review of individual ASQ reports.
- **Conners Early Childhood Questionnaire:** establishment and integration to three-year paediatrician assessment workflows.
- **Participant Data Scoring - completeness tracker:** participant data scoring tool introduced to track, manage and report data compliance across the entire five-year participant journey.
- Commissioning of temporary data system: a test version of ORIGINS ORACLE, a cloud-based online portal providing tools for the databank and engagement teams to facilitate engagement with participants.
- Improved integration with JHC data teams and system, including the linking of midwives' notification system and special care nursery datasets.
- Progress towards establishment of Telethon Kids Institute Enterprise Data Hub to facilitate as a long-term ORIGINS data system solution.
- A new Databank Manager was appointed in October 2019 and databank team members were upskilled.
- The Databank team supported internal teams and sub-projects to successfully deliver the various initiatives.

ORIGINS RESEARCH DOMAINS



KEY CHALLENGES AND STRATEGIES TO ADDRESS THEM

- **Telethon Kids Enterprise Data Hub:** ORIGINS needs for a data management system that will allow the Databank and Biobank to be accessible to researchers and the community. The system needs to meet data governance challenges and be able to absorb complex data sources overtime, including data from sub-projects. The Telethon Kids Data Strategy team is helping ORIGINS build an enterprise data hub to generate a 360-degree view of ORIGINS data, on any given data point.
- **ORIGINS mobile app:** The databank team aims to achieve 80% participant data compliance, by working cross-sectionally within ORIGINS to improve participant engagement and communication via the development of an ORIGINS mobile app.
- **Improve data quality:** Increased data cleaning and quality checking, as well as successful cross-sectional workflows will be achieved through the use of the ORIGINS ORACLE and Telethon Kids Enterprise Data Hub. The team will also be investigating improvements to base systems where possible.
- **Enterprise Data Hub platform:** The Databank team will work closely with Telethon Kids to leverage the Enterprise Data Hub platform and develop fit for purpose applications to improve effectiveness, efficiency and quality of ORIGINS workflows and data collected.
- **JHC:** The Databank Team will be working with the team from JHC Administration and Health Information Department to better integrate additional source systems.

“ The ORIGINS Databank has a total of 11,039,625 datapoints to date. ”

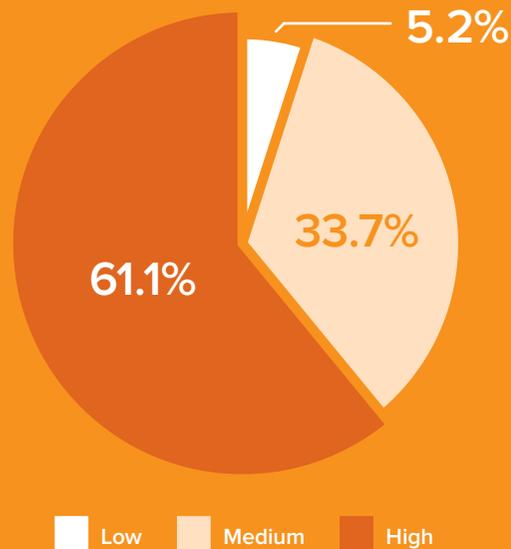
COHORT PROFILE

The data presented in this cohort profile has been sourced from participants (mothers and fathers), largely from self-reported data collected antenatally and from midwives' notification data.

The data has been collected from ORIGINS participants from 2017 to April 2020.

SOCIOECONOMIC STATUS OF ORIGINS MOTHERS

This chart indicates, that the majority of participants in ORIGINS are more affluent, from high and medium socioeconomic backgrounds. ORIGINS plans to increase the diversity of the cohort to reach those from lower socioeconomic status.



PREGNANCY COMPLICATIONS

Many women experience health issues during pregnancy. **24.6%** of ORIGINS participants experienced complications during their pregnancy.

Of note, is the rate of gestational diabetes which can increase the risk of diabetes for the mother post-pregnancy.

The following were the most common:



32 years

The average age of mothers
(range 16-49 years)

37%

The highest education level of the mother was typically a bachelor degree

BIRTH

- Caesarean section was the method of delivery for almost half of all pregnancies (48%)
- The mean gestational age was 38 weeks, with 9% of babies born preterm (<37 weeks). Approximately 1 in 12 babies weighed more than 4kg at birth.

ONE-YEAR-OLDS

- 50% of one-year-olds were given an antibiotic
- 35% of one-year-olds have attended an emergency department.

FEEDING

- 28% of infants have had formula introduced at birth
- 90% of participants have initiated breastfeeding
 - Of those who initiated breastfeeding, 54% were exclusively breastfeeding at 2 months. While 34% were exclusively breastfeeding at 6 months
- Over half (67%) of the children who have attended their one-year clinic have been introduced to solids before they turn 6 months of age. The average age of introduction of solids was 5 months (38%).



LIFESTYLE BEHAVIOURS



“ There are approximately 3650 participants currently enrolled in The ORIGINS Project, of which 56% are enrolled as active participants. ”

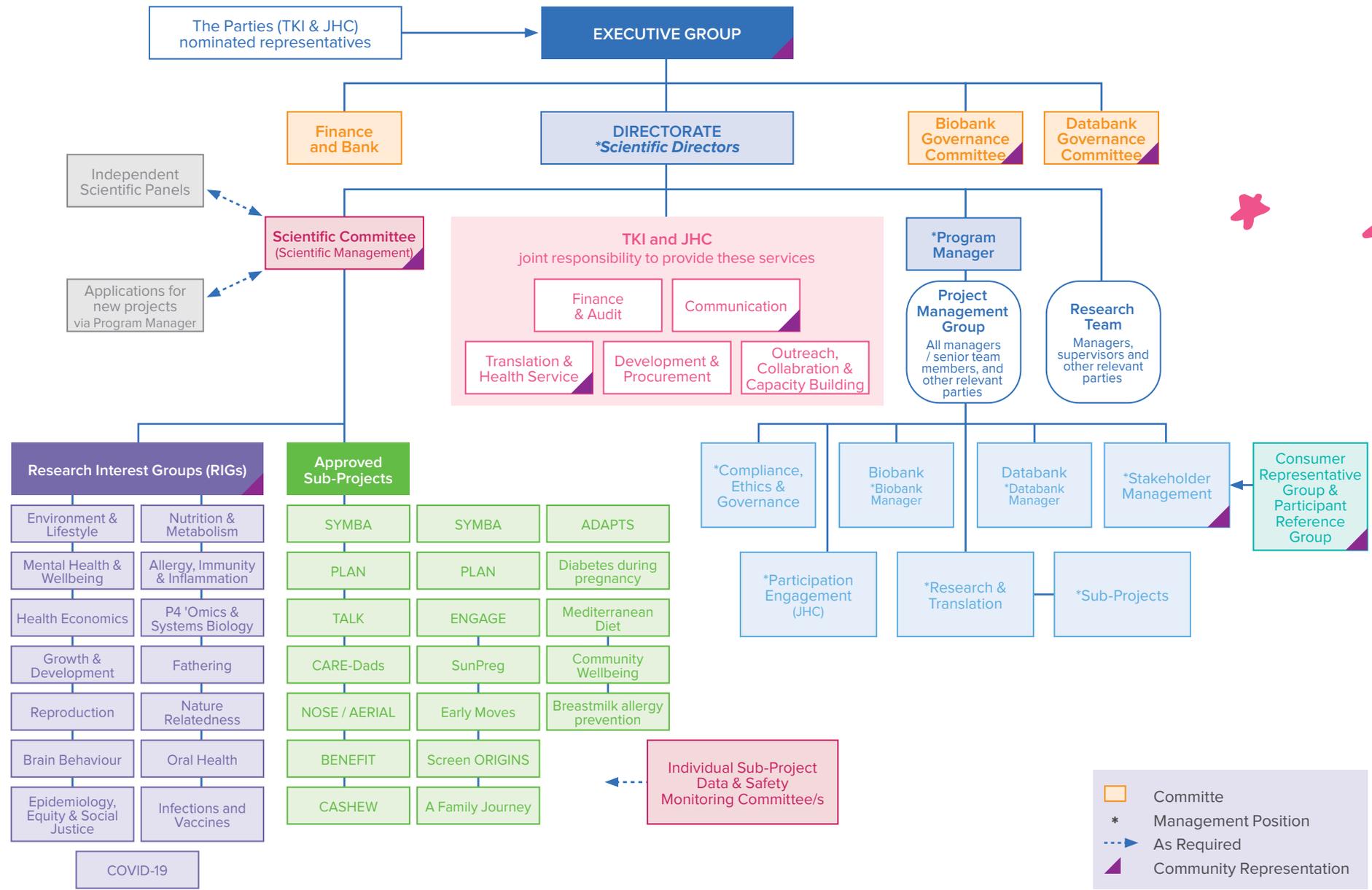




Image from The West Australian

PROJECT GOVERNANCE

A Governance Framework has been developed for ORIGINS to meet governance, compliance and ethics requirements. Consumer and community representation is incorporated into the ORIGINS Governance Framework and structure to ensure that the community is fully engaged and informed about ORIGINS.



- Committe
- Management Position
- As Required
- Community Representation



ORIGINS RESEARCH & SUB-PROJECTS

As well as facilitating strategic long-term research capacity, ORIGINS is a pipeline for short-term productivity through a series of clinical trials, early interventions, mechanistic studies, and targeted research questions to improve maternal and paternal health, and the early environment of the child.

During this reporting period there were 19 approved sub-projects active within ORIGINS, including Randomised Controlled Trials (e.g. SYMBA, The Cashew Study, ADAPTS) and observational studies (e.g. TALK, Screen ORIGINS, CARE-Dads). Sub-projects are at various stages of recruitment and data analysis with 18 projects current and one project (the PLAN Project) completed. Refer to Appendix 1 for further information on each sub-project.

Current & Completed ORIGINS Sub-Projects

SUB-PROJECT	TYPE	IMPACT/FOCUS	STATUS AT 30 JUNE 2020 (N)	FUNDING BODY	GRANT VALUE
The PLAN Project (pilot study): Pregnancy Lifestyle Activity and Nutrition	Randomised Controlled Trial	Overweight and obesity (mother and child)	Completed (57)	Telethon Kids Research Focus Area Seed Grant 2014	\$24,821
Embedding e-Health PLAN app into routine clinical practice pathways	Interventional	Overweight and obesity (mother and child)	Ongoing	WAHTN - Medical Research Future Fund Rapid Applied Research Translation Grant	\$250,000
A family's journey at JHC: Analyses of routinely collected data	Observational	JHC mother and father profiling	Ongoing	JHC and Telethon Kids	In kind
Screen ORIGINS: Longitudinal study of the multidimensional influences and impacts of contemporary screen technology use over the first 5 years of life (quantitative and qualitative)	Observational	Technology use (family)	Quantitative recruitment ongoing (as many as possible) Qualitative recruitment ongoing (30)	Curtin School of Physiotherapy and Exercise Science Early research Grant; Curtin PhD Candidate Research Support Fund	\$6,100
The SYMBA Study: Improving gut health (symbiosis) for allergy prevention	Double-blinded Randomised Controlled Trial	Reducing infant allergies	Recruitment ongoing (480/652)	NHMRC Project grant 2015 Telethon Perth Children's Hospital Research Fund 2014	\$1,681,512.40 for 2016-2020 \$200,000
Testosterone and Language in Kids (TALK) Study	Observational	Cerebral lateralisation and early language development	Ongoing (501/500)	ARC 2015	\$415,000
Cardiovascular Risk Evaluation in Expectant Fathers (CARE-Dads)	Observational	Cardiovascular and mental health of fathers	Recruitment ongoing (500/1000)		In kind \$10,000 contribution
NewbOrn nasal Sampling Evaluation (NOSE) Study (Pilot study of AERIAL)	Observational	Asthma risk	Completed (145)	Under AERIAL funding	
Breastfeeding and Eating Nuts and Eggs For Infant Tolerance (BENEFIT) Trial	Randomised Controlled Trial	Reducing infant egg and peanut allergies	Recruitment Completed (108/108) Study to finish by May 2021	The Financial Markets Foundation for Children Telethon Perth Children's Hospital Research Fund	\$68,616 (2017-2019) \$110,290 (2018-2019)
The Cashew Study: Introducing cashew nuts during infancy	Randomised Controlled Trial	Reducing infant cashew allergies	Recruitment Ongoing (173/192) Study to finish by March 2021	Australian Food Allergy Foundation	\$50,000 (2018-2019)

SUB-PROJECT	TYPE	IMPACT/FOCUS	STATUS AT 30 JUNE 2020 (N)	FUNDING BODY	GRANT VALUE
The PrEggNut Study: A Maternal diet rich in eggs and peanuts to reduce food allergies	Randomised Controlled Trial	Reducing infant egg and peanut allergies	Ongoing (65/150) Study to finish by October 2023	Part of a larger multi-site NHMRC Project Grant	\$100,000 (2019-2023)
The Engage Study: Discovering and delighting in your baby (pilot)	Single arm intervention trial	Parenting education	Recruitment and intervention completed (14/14)		\$615,000 (2019-2022)
The SunPreg Study: Measuring sun exposure in pregnancy and its association with the development of early childhood allergies	Observational	Benefits of sunlight exposure in pregnancy on maternal skin	Recruitment ongoing (32/50) Study to finish by March 2021	Childhood Allergy & Immunology Research group	In kind
ADAPTS: Antibiotic Dysbiosis and Probiotics Trial in infantS	Randomised Controlled Trial	Gut health	Ongoing (30/70)		\$111,700 (2019-2020)
TUMS: Water quality and the microbiome study	Randomised Controlled Trial	Microbiome	Ongoing (69/220)	BHP Blue Sky Awards	\$100,000
Diabetes during pregnancy and subsequent child development: A 3-year follow-up study	Observational	Diabetes	Commencing data extraction	ECU strategic fund/ The SNM researcher support scheme	\$69,033
The impact of a Mediterranean diet and physical activity in pregnancy on gestational weight gain and neonatal body composition at birth and weight at 1 year of age	Observational	Diet, microbiome and mental health	Ongoing	Science Sceptics of WA, 2019-2021	\$8,500
ORIGINS Community Wellbeing during the COVID-19 Pandemic	Observational	Mental health during COVID-19	Ongoing	JHC and Telethon Kids	In kind
Breastmilk Allergy Prevention	Observational	Food allergies, prebiotics	Ongoing	WA Child Research Fund 2018	\$247,597
Early Moves	Observational	Neurodevelopmental assessment of general movements in babies	Ongoing (300/1000)	NHMRC Perth Children's Hospital Foundation WA Child Research Fund 2018 CP Alliance	\$2,256,750.20 (2019-2024) \$446,773 (2019-2020) \$242,919 \$250,000
TOTAL VALUE					\$7,264,611.60

A further 22 new sub-projects have been reviewed by the ORIGINS Scientific Committee and Project Management Group to be nested within ORIGINS. Some are due to commence in the coming months, some are awaiting either ethics approval and/or funding success, while a few are still awaiting final approval from the Scientific Committee and Project Management Group. Refer to Appendix 2 for further information on each sub-project.

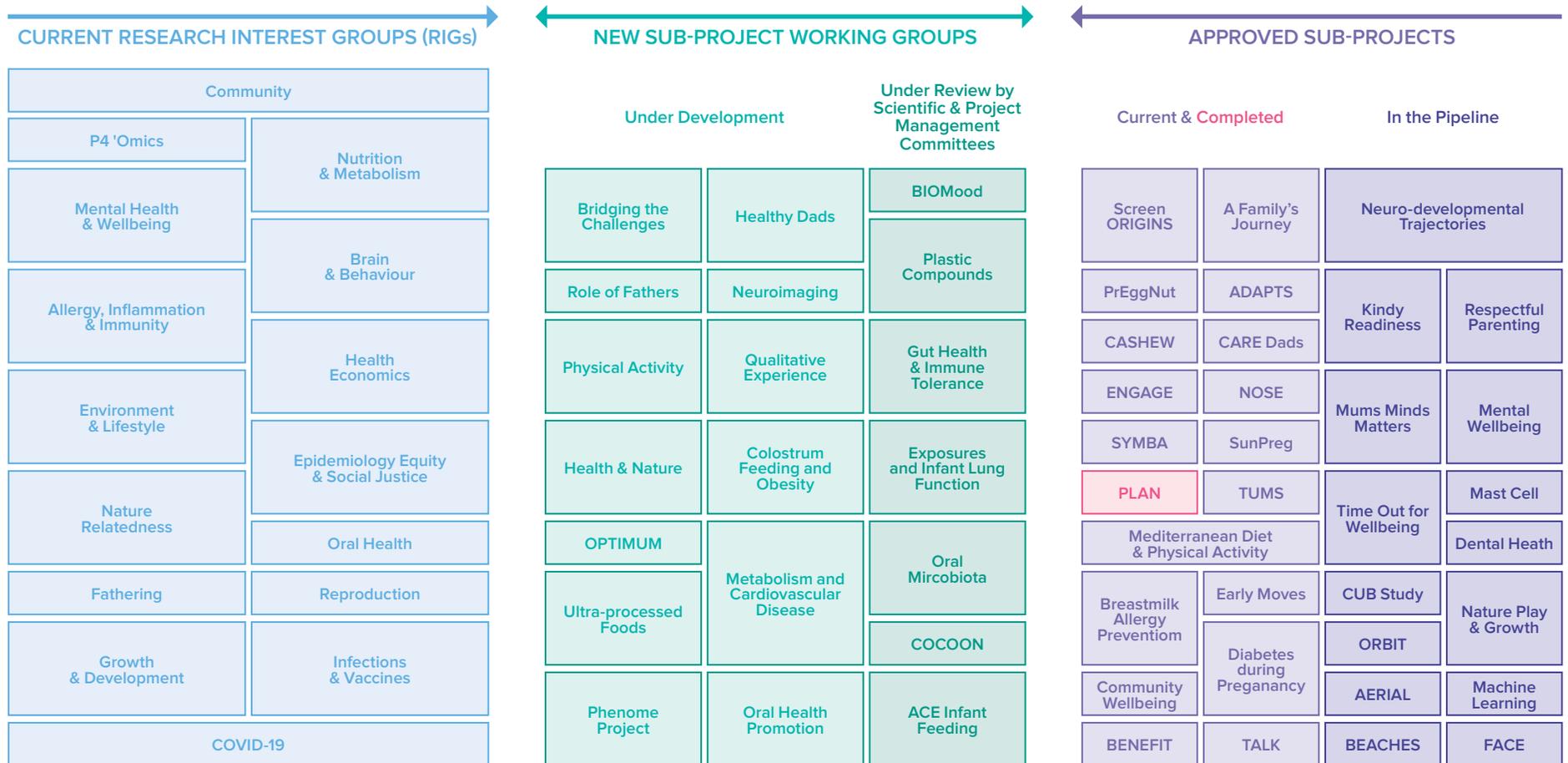


RETURN ON INVESTMENT

The ORIGINS Project infrastructure has been a catalyst for investment in nested sub-projects. The set-up of ORIGINS enables researchers to implement their research projects, leveraging a fully developed platform providing cost savings and economies of scale. ORIGINS recoups costs back into the Project, in order to sustain and increase this infrastructure as a community resource.. A degree of cost recovery is required from those requesting and granted use and/or access to the cohort.

To date the ORIGINS Project infrastructure has attracted independent grant funding in excess of \$7 million. This represents an outstanding return on investment, at the rate of an estimated 1:1 return on annual investment of \$2.6 million a year. In addition, there is committed grant funding in the region of \$4.7 million for projects in the pipeline (Appendix 2).

Current and Future ORIGINS Research



ORIGINS RESEARCH DISSEMINATION

During the reporting period The ORIGINS Project increased awareness at a range of local, national, and international events. This included publication of papers, oral and poster presentations, keynote and invited presentations.

Of particular note was attendance and presentations by members of the ORIGINS Project team at the 11th DOHaD World Congress in Melbourne. Representatives of the ORIGINS Project team were also invited to present at education events at a variety of institutions and collaborator meetings during this period.

EVENTS, WORKSHOPS AND MEETINGS

32
attendees

Health Economics Workshop:
facilitated by ORIGINS Health
Economics RIG members,
Dr Amy Finlay-Jones and
A/Prof Richard Norman

Tour of the
Telethon Kids
Institute labs and an
ORIGINS Biobank
presentation:
JHC maternity staff

Wanneroo
and Surrounds
Early Years
Network meeting
at Telethon Kids Institute,
with tour of the Institute and
presentations from Institute
researchers.

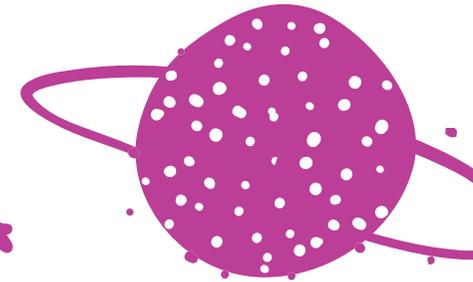
Members of the ORIGINS
Community Reference
Group and Participant
Reference Group participated
in the inaugural
Telethon Kids
Institute CONNECT
community
discussion

RESEARCH INTEREST GROUPS (RIGS)

190
RIG
Members

15
Research
Interest
Groups

12
RIG
Meetings



With increased awareness and collaborations, membership to the ORIGINS RIGs grew during this reporting period. Two new RIGs were also established: 'Infections and Vaccines' and 'COVID-19'. To encourage collaboration and review across disciplines and research interest areas, the ORIGINS Project hosted an 'All RIG member' meeting. Following the success of this meeting and positive feedback 'All RIG member' meetings will now be held quarterly.

RESEARCH COMMUNICATIONS AND ENGAGEMENT

- Through the COVID-19 pandemic the ORIGINS Project adopted the use of Microsoft Teams platform as a team-wide communication tool, facilitating positive collaboration.
- A number of virtual communication channels were established to engage and maintain connection with stakeholders and collaborators in addition to hosting virtual meetings during the COVID-19 period.
- The ORIGINS Scientific Committee and Project Management team reviewed 14 new sub-project proposals.





RESEARCH TRANSLATION

As well as enabling strategic long-term research capacity, ORIGINS is a 'responsive' system with 'real-time' feedback to parents and their children, and translation to clinical and diagnostic services. While immediate action is facilitated, ORIGINS also encourages long-range thinking and advocate strategies that might not necessarily have immediate impact but have long-term benefits for individuals and the community.



KEY ACTIVITIES

- ORIGINS provides real-time feedback and referral to appropriate services for participants – mother, father and child - for a range of issues including developmental, allergies, and psychosocial needs. Every child within the ORIGINS Project receives real time feedback. To date, 48% of the cohort have had an issue identified and a management plan provided.

EARLY INTERVENTION FOR ORIGINS CHILDREN

ORIGINS children attend a one-year and three-year clinic appointment where they are assessed by a paediatrician, on review of data collected using the Ages & Stages questionnaires. Families are referred to relevant follow-up services if issues are identified. The Early Connors development questionnaire is completed at three-years of age.

400

one-year clinic appointments

52

three-year clinic appointments

51

positive skin prick (allergy) tests

1,275

Ages & Stages questionnaires

200

children received additional paediatrician follow up or referred onto a GP or child health nurse for extra support

20

three-year-olds identified through the Early Connors development and ASQ questionnaires to have significant developmental concerns and referred to appropriate early intervention support

EARLY INTERVENTION FOR ORIGINS PARENTS

- ORIGINS mums complete the Australian Eating Survey at various timepoints to track their dietary patterns and eating behaviours. Feedback provided means that participants can gauge how they compare to the ORIGINS cohort and the general population. 850 eating reports were sent to participants.
- Of the 157 fathers enrolled in the CARE-Dads sub-project, 20% (n.31) were referred on to a GP for high blood pressure or mental health concerns.



We have identified many issues over the three years that the study has been running. A common one is iron deficiency – you’d be surprised how many kids are low in iron. In fact, at the three-year appointment that is conducted as part of The ORIGINS Project, iron studies are now routinely sent off to enable some real-time feedback.

CONSULTANT PAEDIATRICIAN DR JAMIE TAN



REAL TIME FEEDBACK

ORIGINS participant Nina Dorieux knows the benefits of the project's real-time feedback. When son Noah, who was seven months old at the time, was identified with speech and developmental delays through the ORIGINS assessments, consultant paediatrician Dr Jamie Tan quickly responded and let her know that a follow up was needed.

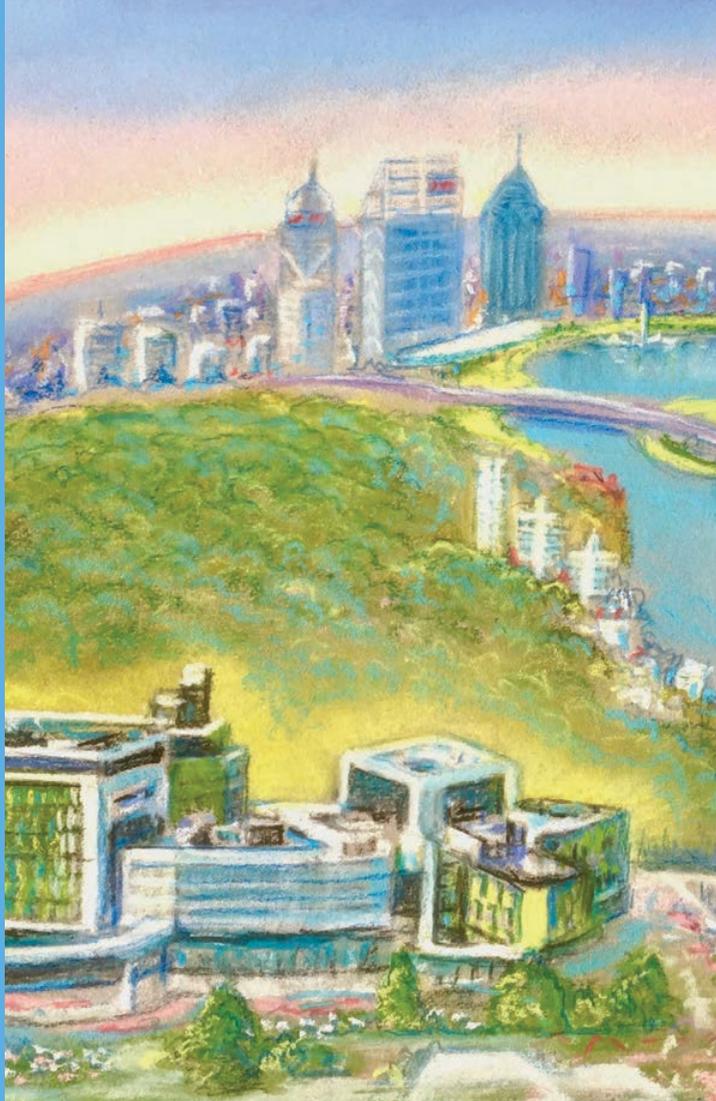
"There were some things that we had noticed with Noah's development, but sometimes as a Mum, you don't want to appear paranoid, so you let them go," Nina said. "When the ORIGINS Team got in touch to let me know that it would be a good idea to see a physio, I was grateful that my concerns were validated."

Noah is now two-years old and has been seeing a physio and getting help with his speech and hearing.



Nina Dorieux with son Noah.

"I definitely don't think we would have had the same access to specialists and resources to support us with Noah if we weren't part of the ORIGINS cohort," Nina said. "His delays were identified earlier than they would have been otherwise, say at the standard one-year paediatric check-up, and I have no doubt he is developing better because of that earlier intervention."



NATURE BRIDGE PROJECT – BUILDING BRIDGES OF OPPORTUNITY

In 2019 ORIGINS began working with Nature Play WA to promote awareness that experiences in nature have proven benefits for mental and physical health and wellbeing. In collaboration with Perth Children’s Hospital and the Kings Park Botanic Gardens and Parks Authority (BGPA), ORIGINS has been exploring the possibilities of building stronger physical and functional links between the Perth Children’s Hospital (PCH) campus and neighbouring Kings Park. Griffin Longley, CEO of Nature Play WA and Professor Susan Prescott held several nature “walk shops” to underscore the importance of developing programs and organisational relationships that will enable a greater use of Kings Park by PCH for the benefit of children, families and staff on the campus, and promote the enormous value of nature connectedness in the much wider community.

IMPACT OF ORIGINS SUB-PROJECTS

- **PLAN** – Based on the results of a pilot study within ORIGINS, investigating whether a lifestyle intervention in early pregnancy can reduce offspring adiposity, a translational grant was awarded to the researchers in 2019. PLAN has been expanded as a smartphone web-based application for all pregnant women who attend Joondalup Health Campus at any time during pregnancy.
- **CARE Dads** – All fathers in the study complete a questionnaire assessing stress, depression and anxiety. In the reporting year, nine fathers have been referred to their GP to access psychological services, and a further one was identified with severe or very severe levels of low mood/anxiety/stress and were referred to JHC psychiatry.
- **TALK study** – Approximately 143 hearing tests have been completed with Earbus Newborn Hearing Screeners with 394 follow-ups completed (6 to 9-month-old time point).
- **BENEFIT** – One third of the mothers in the BENEFIT study have received Lactation Consultant assistance to establish and support breastfeeding which was funded by the sub study grant.
- **EARLY MOVES** – Have identified two babies that have been referred to Early Intervention Clinic at Perth Children’s Hospital for comprehensive developmental assessment on the basis of their GM results.
- **TUMS** – 64 water filtration systems installed (note, half are sham filters).



Having the PLAN app as part of routine procedure at the antenatal clinic, certainly helps with difficult conversations around weight gain in pregnancy that may assist women getting intervention and support at an appropriate time in pregnancy.



JHC ANTENATAL CLINIC MIDWIFE NICOLE SHAW



COVID-19 RESEARCH PROJECTS WITHIN ORIGINS

ORIGINS responded immediately to the global crisis and facilitated several research opportunities. While the world seeks to develop effective human vaccine and treatment solutions, ORIGINS intends to understand the behavioural, physiological and psychosocial impacts of a community exposed to COVID-19. The Project is tracking local response to risk of the virus to understand the wider societal implications such as financial adversity and family functioning. Longer term, the team can assess impacts on the next generation and compare across cohort studies.

“

I think you guys are doing a great job of this project, and fantastic to try and get some more research done during the pandemic. Thank you for contributing, and I look forward to reading your results when published.

”

Pleased to see this survey taking place - I think there will be a broad impact on mental health and family dynamics.

ORIGINS PARTICIPANT



The following projects commenced within ORIGINS, and a new Research Interest Group was established:

1. COMMUNITY WELLBEING PROJECT

This Project provides a comprehensive snapshot and longitudinal assessment of a community's response to the pandemic. The Project will assess perceived stress and wellbeing in the ORIGINS cohort during and post the COVID-19 pandemic over a six-month period. The project commenced in April 2020 and two months worth of data has been collected: 20% of the cohort responded to these additional questionnaires. Measures include behavioural patterns, perceived stress, family functioning, financial hardship, adversity and mental wellbeing. Semi-structured interviews will be conducted with a sub-set of ORIGINS participants to collect more in-depth information on behavioural responses and patterns to inform future pandemic planning.

2. COCOON STUDY: COVID COMMUNITY COMPASSION STUDY

The COCOON Study: COVID COmmunity CompassiON Study: "Assessing virus transmission and impact on the wellbeing of the ORIGINS Community" will recruit a subset of ORIGINS participants (n.150) who will track daily temperatures, take regular swabs and report on mental health and wellbeing measures (replicated in the Community Wellbeing Project). Due to the current low numbers of COVID infections in Western Australia, the protocol has been re-designed to look at all virus transmissions during this period.

3. ORIGINS COVID-19 RESEARCH INTEREST GROUP

A COVID Research Interest Group (RIG) was established in April within ORIGINS with a specific focus on COVID-19 and pandemics.



Jamee Brien, who has been a participant of The ORIGINS Project since her third child was born three years ago, is taking part in the additional study Community Wellbeing during COVID-19 study that was introduced to participants during the pandemic.

"Being isolated at home with three very energetic young kids can really take its toll," she said. "I adore my family, but when you add in financial pressures, the constant concern for your family's health, trying to follow all the rules and do the right thing, it can be really stressful.

"For better or worse, we are spending so much more time together than we normally would and that is already having a real impact on my family."





STAKEHOLDER & COMMUNITY ENGAGEMENT

ORIGINS is a community project with global implications therefore community collaboration is essential for the project. Strong stakeholder management and engagement is paramount to securing commitment at every level of ORIGINS. Strong relationships have been developed with a broad range of stakeholders and community groups and continue to work in collaboration for mutual long-term benefit.



KEY ACTIVITIES

- **Strong links established with:**
 - 34 research groups / academic institutions
 - 19 service provider organisations
 - 10 community groups.
 - See Appendix 3 for a full list of collaborators and partners.



STAKEHOLDER ACTIVITIES AND EVENTS

- ORIGINS booth at the Telethon Beneficiaries Expo at the Telethon Weekend; over 250 visitors to the booth.
- Monthly Coffee and Connect sessions for ORIGINS families at a local community centre:
 - On average 15 families attended each session.
 - Establishment of a local Child Health Nurse (CHN) attending each session
 - These sessions ceased March-June due to COVID-19
- Fathers' Coffee & Connect session to celebrate Fathers' Day; with representatives from Ngala and The Fathering Project
- Establishment of The ORIGINS Community Facebook Group; a group for ORIGINS families to connect with each other. Since its launch in April, there are over 60 members.



- JHC Maternity Staff Tour of Telethon Kids Institute Labs to experience the sampling process and presentation on ORIGINS.
- Visited and presented to 10 GP Clinics in the Wanneroo and Joondalup area.
- ORIGINS booth and community discussion at the Strong and Deadly Mob Community Event in Yanchee.
- Community and participant reference group
 - face-to-face meeting in September 2019.
 - members of the group reviewed and provided feedback on 8 project protocols/ documents.
- Regular e-newsletters and updates to ORIGINS participants.
- Regular media in a range of formats including radio, television, online forums and community newspapers (see Appendix 5).





ORIGINS STAFF, VOLUNTEERS & STUDENTS

Key to ORIGINS are the staff, volunteers, and students. They are the drivers of the project, led by the Directors and senior management team. The ORIGINS Project team members demonstrate passion and commitment generated from a strong belief in The ORIGINS Project's vision and aims.



STAFF

- 38 staff working within The ORIGINS Project, many of whom work in a part-time capacity are employed either through Telethon Kids Institute or JHC via Ramsay Health Care.
- Training: Anti-Bullying and Harassment, Mental Health Awareness, Cyber Safety, Drug and Alcohol Awareness, Code Black, Venepuncture in Small Children; and Phlebotomy.
- Quarterly internal staff celebration established to enhance the health, wellbeing and unity of the ORIGINS Project team. Awards presented: **'Above and Beyond'** and **Eco Champion**;

STUDENTS

- The ORIGINS Project is a community resource that invites collaborative projects and initiatives, including those of students. ORIGINS welcomes undergraduate, Honours, PhD, Masters, and Doctor of Medicine (MD) students in addition to junior doctors wishing to undertake a research placement or project as part of their studies.
- Students can be involved with The ORIGINS Project or one of the sub-projects. This year the project engaged:
 - 11 PhD candidates
 - 2 undergraduate students
 - 3 MD students
 - 1 Masters student

VOLUNTEERS

- 9 valued volunteers

The ORIGINS Project is fortunate to have a small passionate and dedicated group of longstanding volunteers (n. 3) through the JHC volunteering program who regularly assist with project tasks such as sample pack making, filing and other administrative duties. In addition to these volunteers, there are a number of other volunteers (n. 6 during this reporting period) who assist with ORIGINS Project tasks and some sub-project duties. Students also volunteer with the Project further or prior to their student placement with ORIGINS. Junior doctors have also volunteered for valuable research experience. Several of our previous volunteers are now in paid employment within The ORIGINS Project team.

THE ORIGINS STUDENT CIRCLE

A newly established group inviting all current, past and future students involved with The ORIGINS Project or one of the sub-projects. The 'Circle' offers an opportunity for students to network with the ORIGINS team and fellow students.

Students may present and discuss their research, hear from members of the ORIGINS team, and request and receive support from ORIGINS and their peers.



PROJECT OPPORTUNITIES

The ORIGINS Project needs to constantly review and refine processes to ensure project design is enhanced and it continues to resonate with the community. The team strive to make project implementation improvements as an iterative process.



ENHANCED FAMILY LIAISON

The relationship with participant families is central to the success of ORIGINS. As time goes on, it is recognised that some families have, and will, become disengaged (e.g. miss a sample, questionnaire or clinic appointment).

The year ahead: Renew focus on our current families to re-engage them, in order to maximise their benefits in participating in the ORIGINS Project.

INCLUSION OF DISADVANTAGED POPULATION GROUPS

The project aspires to ensure access to the study is equitable for the whole community and that research interventions should be accessible to all. The current ORIGINS cohort profile is skewed towards the more advantaged groups with only 3.5% in the lowest socio-economic index of advantage. It is important that the study also reaches these people. During and post-pandemic, the numbers of people adversely affected – physically, mentally and economically - will undoubtedly increase.

The year ahead: Working with JHC staff, such as social workers and Aboriginal liaison officers, actively identify, target and engage disadvantaged people, in the JHC catchment region, particularly those most vulnerable due to the additional economic hardship of the COVID-19 response. ORIGINS will redirect relevant families to local support services through an ORIGINS family liaison officer. This position will be a vital part of establishing and maintaining trustful relationships with the families to help maintain engagement with more vulnerable groups throughout their journey with ORIGINS. Appropriate tailoring will be considered, such as data collection via phone interviews rather than online surveys.

BRIDGING THE CHALLENGES PROJECT

The *Bridging the Challenges Project* is an essential core sub-project of ORIGINS with the overarching aim of improving the health and quality of life of the next generation in targeted areas of entrenched disadvantage within the ORIGINS catchment region.

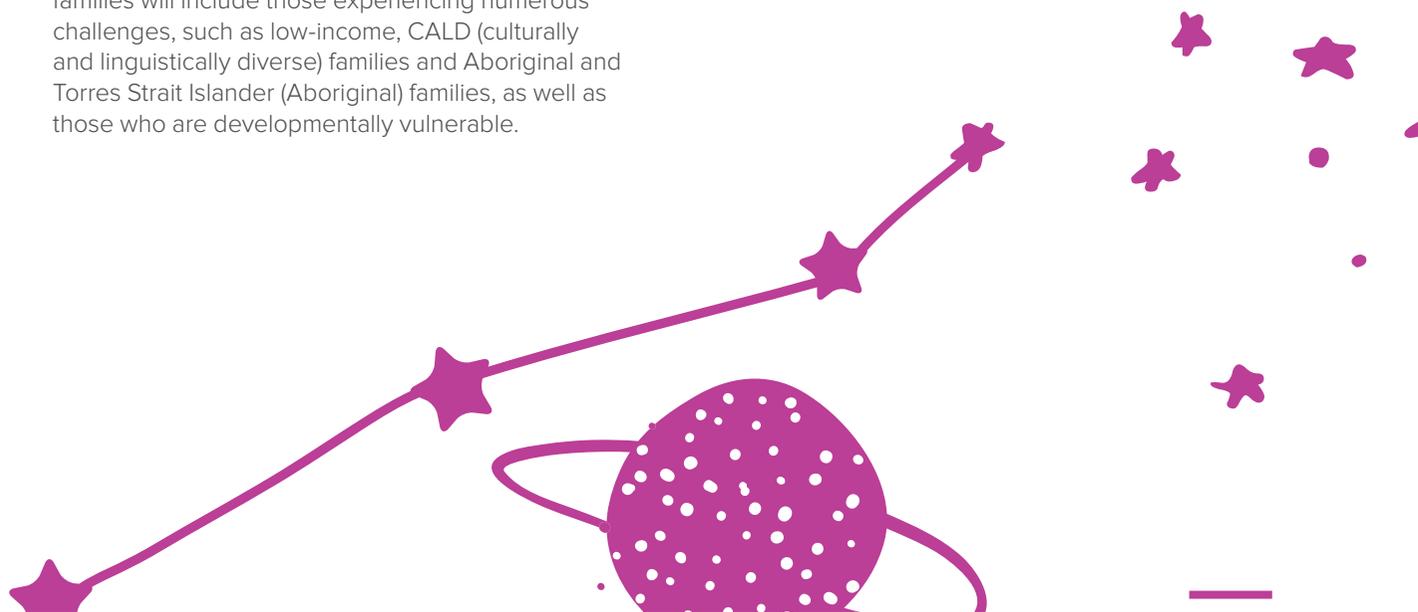
This pilot project will scope the need, test the feasibility and acceptability of an outreach hybrid model (“community hub”), as well as capture valuable research data. The “community hub” would become a “one-stop shop” to support families in need, providing a range of interventions, ORIGINS sub-projects onsite care and redirection to appropriate support and services. To achieve this broadening of ORIGINS, it is acknowledged that the Project will require additional funding.

The year ahead: Identify and target young families i.e. women from pre-conception or families (siblings, mother, father and other significant family members) caring for children up to the age of five years old. The families will include those experiencing numerous challenges, such as low-income, CALD (culturally and linguistically diverse) families and Aboriginal and Torres Strait Islander (Aboriginal) families, as well as those who are developmentally vulnerable.

DEVELOPMENT OF A KNOWLEDGE TRANSLATION NETWORK

Cohort studies are ideal platforms for tracking change over time. Established cohort studies have the infrastructures in place to respond to and interpret immediate impact and effects on their participants. This knowledge can be informative for policy makers and funders to responsively plan appropriate services and care.

The year ahead: The ORIGINS Project, in conjunction with other cohorts, such as the Raine Study are intending to form a Knowledge Translation Collective. Policy makers and practitioners could ask questions of interest in large cohorts which would guide policy decisions and planning. This information can be retrospective or prospective.



APPENDIX 1: ACTIVE ORIGINS SUB-PROJECTS

1. The PLAN Project: (pilot study) Pregnancy Lifestyle Activity and Nutrition (PLAN)

The pilot study for the PLAN RCT tested whether a lifestyle intervention in early pregnancy can reduce offspring adiposity. This project used a smartphone web-based application to deliver diet, physical activity and wellbeing advice to women in early pregnancy (over the course of 6-20 weeks gestation) to optimise their gestational weight gain (weight gain during pregnancy) within the recommended medical guidelines. The feasibility of the app proved successful with the potential for inclusion in routine clinical practice pathways aimed at providing a healthy start to life.

2. A Family's Journey at JHC: Analyses of routinely collected data

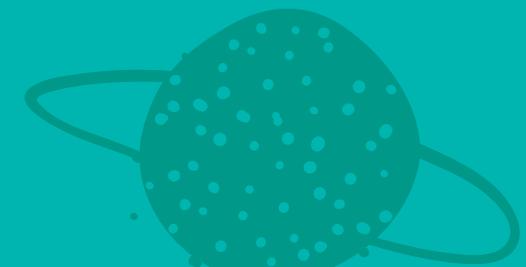
This project aims to analyse routine data collected at JHC to better understand the demographics and journey from pregnancy to early childhood of all pregnant women, their partners and their newborn. It is anticipated that this will enable a better understanding of the care provided to inform improvements in routine care at JHC. Analysis of routinely collected data will also provide useful information for researchers wishing to apply for grants which may eventually result in sub-projects within the ORIGINS Project. An extract of the data from this project has been used to prepare a manuscript, 'Adverse pregnancy and neonatal outcomes associated with elevated maternal and paternal body mass index (BMI): a single-centre retrospective cohort study'.

3. Screen ORIGINS: Longitudinal study of the multidimensional influences and impacts of contemporary screen technology use over the first 5 years of life (quantitative and qualitative)

The Screen ORIGINS study aims to understand family screen technology use, particularly mobile touchscreen devices (i.e. tablet computers and smartphones), including what influences family screen technology use and potential implications for child health and development. This study plans to use data routinely collected as part of the ORIGINS Project via web-questionnaire (quantitative component). A subset of approximately 30 ORIGINS participant families at different stages (before birth; between 6 and 12 months post-birth; 2, 3 and 5 years post-birth) will provide further in-depth information on their perspectives and practices related to screen technology use in interviews (qualitative component).

4. The SYMBA Study: Improving gut health (symbiosis) for allergy prevention

The aim of the SYMBA Study is to examine if a high fibre prebiotic supplement, taken during pregnancy and while breastfeeding, will reduce the risk of allergic disease in children by improving the balance of 'healthy bacteria' in the gut. SYMBA is a placebo-controlled, single-blind study. Recruitment will include pregnant women at JHC that have a family history of allergic disease, as they are more likely to have children with allergies. Participants are randomly assigned to an intervention group (prebiotic powder) or a placebo (carbohydrate powder) taken once a day from 20 weeks gestation until their baby is six months. Participants (mother and baby) are followed up at 4, 6- and 12-months post birth. At present, 315 1-year olds have been seen, representing a 95% completion rate.





5. Testosterone and Language in Kids (TALK) Study

The TALK study is seeking to understand how testosterone exposure in the womb may relate to brain growth before birth and language development after birth. The development of language is complex and there is evidence for a relationship between language development and a wide range of positive health outcomes later in life. Data will be collected from 18 weeks pregnancy, and until the child is three years of age. The recruitment goal (500 participants) has been met and 370 children have been seen for their 6 to 9-month follow-up assessment. This study will help to better understand how children acquire language and how to best support children who have difficulties learning language.

6. Cardiovascular Risk Evaluation in Expectant Fathers (CARE-Dads)

The aim of the CARE-Dads Study is to assess the health of expectant fathers by providing a health check-up. Dads play an important role within the family as their involvement in child-rearing enhances the health of their children. Studies have shown that a father's involvement in his child's life can be associated with positive child outcomes. A healthy Dad is an important part of a nurturing early environment. Dads are seen antenatally and when their child is one year of age. A full health report is provided at both time points, including a mental health assessment by means of the DASS-21. Findings will provide insight into the ways in which the health of dads-to-be can be improved.

7. Newborn Nasal Sampling Evaluation (NOSE) Study, pilot study for the Airway Epithelium Respiratory Illnesses and Allergy (AERIAL) Study

This pilot study assessed whether enough epithelial cells could be obtained from a nasal sample at birth to investigate gene patterns. Recruitment is now completed. At birth, a very small brush was used to obtain a sample of cells from inside baby's nose. The outcomes of the NOSE study were used to inform the development of a larger study (AERIAL) investigating epithelial cells in the nose to determine any gene signature patterns which may predict the development of wheeze, allergy and asthma later in childhood.

8. Breastfeeding and Eating Nuts and Eggs for Infant Tolerance (BENEFIT) Trial

The aim of the BENEFIT Trial is to determine whether the amount of eggs and peanuts a mother eats during breastfeeding has an influence on her baby's food allergy development. By one year of age, 10% of babies will develop a food allergy. Regular consumption of allergenic foods in early life can help to reduce food allergies. However, this is too late for some babies, who have an allergic reaction to a food the first time it is consumed. It is hypothesised that during breastfeeding could be the ideal opportunity to prevent childhood food allergies since the food proteins in allergenic foods, like egg and peanut, can be detected in breast milk. However, research is needed to understand what amounts of eggs and peanuts eaten during breastfeeding will help to reduce the risk of childhood food allergies. Recruitment is now complete with mothers assigned to either group 1 (eggs and 60 peanuts per week) or group 2 (up to 2 eggs and up to 20 peanuts per week). Babies will be followed for until nine months of age. Lactation consultant support is offered to women who are part of the BENEFIT Trial.

9. The Cashew Study: Introducing cashew nuts during infancy

The aim of this study is to pilot regular cashew nut spread intake by infants from six months to one year of age to determine dosage recommendations prior to a larger RCT. Recent Australian research has found that approximately one in twenty school students have a current food allergy. Furthermore, cashew nut allergy is the most common of the tree nut allergies in adolescents. The 2016 revised Australasian Society of Clinical Immunology and Allergy (ASCI) infant feeding and allergy prevention guidelines recommend all infants should be given allergenic foods including peanut butter, cooked egg, dairy and wheat in the first year of life. However, there is no specific mention of tree nut foods. This is due to a lack of evidence for the effect of regularly eating tree nuts in early childhood on tree nut allergy prevention. Infants will be randomly assigned to Group 1 (1 teaspoon three times per week) Group 2 (increasing from 1 teaspoon to 3 teaspoons three times per week) or Group 3 (no specific recommendations to introduce cashew nut spread). Recruitment is ongoing with 173 infants having completed their one year assessment.

10. The PrEggNut Study: A Maternal diet rich in eggs and peanuts to reduce food allergies

Recently, babies have been found to be at risk of developing a food allergy even before they start eating solid foods. Researchers have discovered that baby immune responses can be improved by mothers eating more eggs during the first weeks of breastfeeding. The aim of this trial is to determine whether mothers regularly eating more eggs and peanuts during pregnancy and breastfeeding (from 22 weeks gestation until four months post birth) will reduce food allergies in their babies. Mothers are assigned to either Group 1 (at least 6 eggs and 60 peanuts per week) or Group 2 (no more than 3 eggs and 30 peanuts per week). Babies will be followed up until four months of age.

11. The Engage Study: Discovering and delighting in your baby (pilot)

The Engage study was a pilot that investigated a behavioural intervention for increasing the quality of parent-baby social interactions in the first six months of life. The Engage study commenced recruitment in April 2019 with a total of 14 families recruited into the study. The study involved two parent education sessions during the pregnancy period, and then up to 10 sessions with the parent and baby after the baby is born. Data analyses are now underway to inform the full RCT.

12. The SunPreg Study: Measuring sun exposure in pregnancy and its association with the development of early childhood allergies

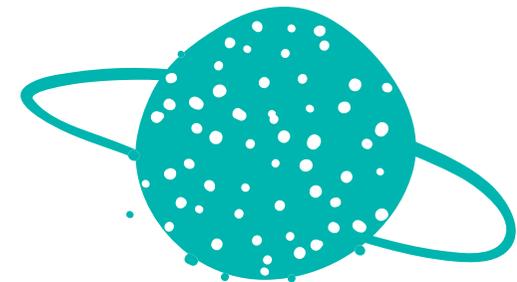
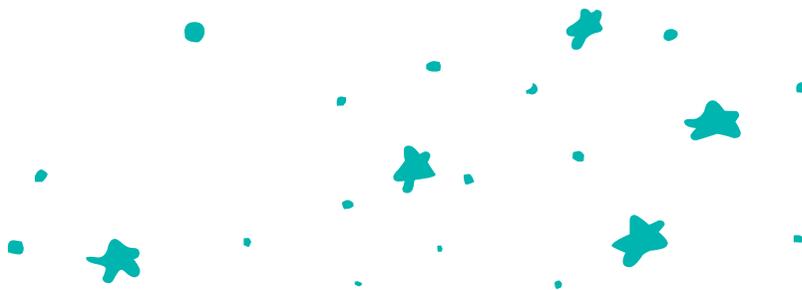
This study aims to investigate the association of sun exposure in pregnancy on the development of conditions such as eczema. With our sunny climate throughout the year, safe and regular exposure to sunlight may be an inexpensive way to limit the development of non-communicable diseases. Women will attend an appointment at 28-week gestation to measure sun exposure, skin pH and skin barrier function. Findings from the SunPreg Study will inform future trials of safe sun exposure. The results will also be key in translation activities to develop better sun exposure policies with the Cancer Council WA that provide advice to pregnant women on the right balance of sun protection and exposure.

13. ADAPTS: Antibiotic Dysbiosis and Probiotics Trial in infants

ADAPTS is RCT involving full term infants who are exposed to antibiotics in the neonatal unit at JHC. It is well known that antibiotics exposure in neonates, at a time when the normal development of gut flora occurs, can have long term health impacts. ADAPTS uses supplemental probiotics to promote the normal development of gut flora and plans to study its effect on short term outcomes such as infantile colic, maternal mental health, as well as long term immune responses in infants. Recruited babies will be followed up for one year.

14. TUMS: Water quality and the microbiome study

This RCT will examine the effects of untreated tap water and filtered water on the development of the gut microbiome in infants. It seeks to understand if exposure to chlorine, heavy metals and pesticides in tap water is safe for microorganisms that colonise the gut and if gut dysbiosis leads to chronic disease. Children will be recruited at six months and assigned randomly to Group 1 (Filtered water group) or Group 2 (Control group) and followed up until 18 months of age. This study aims to ensure that the way tap water is treated is optimised for promoting a healthy tum in early childhood.





15. Diabetes during pregnancy and subsequent child development: A three-year follow-up study

Risk for developmental delay in children is regarded as an interaction of genetic and environmental factors. Several hypotheses have been generated about the association between intrauterine environment and subsequent child development, but conclusions are yet to be reached. The aim of this study is to track a large participant cohort from prenatal life to three years of age to examine the association between exposure to maternal diabetes in utero and subsequent development in the offspring.

16. The impact of a Mediterranean diet and physical activity in pregnancy on gestational weight gain and neonatal body composition at one year of age

This study aims to examine how a Mediterranean diet and exercise in pregnancy influences neonatal body fat composition at birth and weight at one year of age. Mothers' exercise and Mediterranean dietary compliance will be assessed through antenatal web-based questionnaires. The questionnaires will be linked with the infants Air Displacement Plethysmography (PEA POD) measurements post-delivery and anthropometry at one year of age to directly assess if high or low adherence to exercise and/or Mediterranean diet in pregnancy affects infant body fat composition and weight at one year.

17. ORIGINS Community Wellbeing during the COVID-19 Pandemic

The COVID-19 pandemic has created forced isolation and increased financial pressures with families being confined together at home potentially creating stress and altered family dynamics. This study will investigate how ORIGINS families are coping during this time, and their experience of living through this pandemic. All ORIGINS participants, ORIGINS staff and collaborators, and JHC staff will complete voluntary monthly questionnaires to measure wellbeing, perceived stress, financial hardship, and family functioning during the COVID-19 pandemic.

18. Breastmilk Allergy Prevention

This study will investigate if modifying maternal diet with prebiotic fibre supplementation during pregnancy and breastfeeding, creates a breastmilk that is more likely to reduce food allergy in offspring. The project will contribute data to inform maternal dietary interventions for allergy prevention in breastfed children. This study will also potentially reinforce the importance of breastfeeding, by highlighting its role in allergy prevention.

19. Early Moves

The Early Moves study is investigating whether a baby's early movements can predict learning difficulties later in childhood. Participants are required to take short (3 minute) videos of their baby at several timepoints using a smartphone app. A developmental assessment is then carried out when baby is two years old. This study will help us to better understand how to recognise developmental difficulties early enough to provide support and intervention in the first year of life, a critical period of brain development.



APPENDIX 2: ORIGINS SUB-PROJECTS IN THE PIPELINE

SUB-PROJECTS IN THE PIPELINE	TYPE	IMPACT/FOCUS	STATUS AT 30 JUNE 2020	FUNDER	GRANT VALUE
ORIGINS of neuro-developmental risk and resilience: Examining neurodevelopmental trajectories of infants in the ORIGINS Cohort	Observational	Neurodevelopmental trajectories	To commence July 2020	WA Child Research Fund	\$230,842
The CUB (Communicating and Understanding your Baby) Study	Randomised Controlled Trial	Infant development	To commence July 2020	NHMRC Investigator Grant	\$1,100,000
The AERIAL Study: Airway Epithelium Respiratory Illnesses and Allergy	Observational	Asthma	To commence July 2020	NHMRC	\$1,942,791
Mums Minds Matter (Pilot)	Randomised Controlled Trial	Antenatal stress and wellbeing	To commence July 2020	Telethon Kids Institute internal funding	\$35,000
The BioMood study: A pilot study assessing the association between Mediterranean diet (MD), microbiome, metabolome, inflammation and mental health during pregnancy (pilot)	Observational	Maternal adherence to a Mediterranean Diet, inflammation, and mental health	To commence July 2020	Science Sceptics of WA, 2019-2021)	\$40,000
Time Out for Wellbeing	Observational	Assessing online wellbeing program types	To commence July 2020	UWA (Faculty of Health & Medicine) Telethon Kids Institute Student support (UWA Faculty of Health & Medicine) and in kind	Phd Student Support
Machine Learning: Personalised, machine learning based prediction of asthma and allergies in WA	Observational	Personalised, machine learning based prediction of asthma and allergies in WA	To commence July 2020		PhD Student
Kindy readiness in the ORIGINS Cohort	Observational	Children's development, wellbeing, and preschool readiness	To commence July 2020	In kind (JHC and Telethon Kids Institute)	In Kind support
BEACHES (Built Environments And Child Health in WalEs and AuStralia)	Observational	Compare aspects of different Australian and Welsh, UK built environments and the impact they have on children's physical activity, sedentary time, diet, and obesity	To commence August 2020	NHMRC and UK Research and Innovation Grant	\$797,256 over 3 years



SUB-PROJECTS IN THE PIPELINE	TYPE	IMPACT/FOCUS	STATUS AT 30 JUNE 2020	FUNDER	GRANT VALUE
Onset of severe RSV bronchiolitis due to identified maternal or environmental viral transmission (ORBIT) Study	Observational	Cellular location of RSV during maternal transmission	To commence August 2020	PCH Foundation Project funding	\$79,000
An intervention to enhance psychological wellbeing in families from pregnancy to infancy (pilot)	Observational	Prevention and early intervention program designed to improve the coparenting relationship	To commence August 2020		PhD Student Support
A Respectful Approach to Early Parenting	Randomised Controlled Trial	Parent-child relationship, parent confidence, parental stress and child outcomes	To commence October 2020		PhD Student
THE COCOON Study: The COvid COmmunity compassiON study, assessing virus transmission and impact on the wellbeing of the ORIGINS Community	Observational	Virus transmission, immunity, and family wellbeing during COVID-19	Awaiting ethics approval	Respiratory Research Centre Inspiration Awards	\$100,000
Contribution of a novel mast cell subset to development of atopic disease	Observational	How mast cells are “programmed” in allergic and non-allergic children, potential to find biomarkers of early life allergic disease	Awaiting ethics approval	BHP Blue Sky Awards	\$100,000
Nature Play and Grow (Pilot)	Intervention	Parent and child nutrition, physical activity, emotional wellbeing and connectedness to nature	Awaiting funding and ethics approval	WA Health Department	\$242,016
Facing the ORIGINS of health and disease (FACE)	Observational	3D face scanning (infant)	Awaiting funding and ethics approval		Awaiting funding
Helping new mums to be better breastfeeders before their babies are even born (ACE – Infant Feeding)	Randomised Controlled Trial	Breastfeeding	Amendment awaiting SC and PM approval	WA Health Department	\$75,000
Maternal beneficial microbiota reduces infections and allergic diseases by epigenetic changes involved in ‘trained immunity’	Mechanistic	Foetal immune system and inflammatory disease	Awaiting SC and PM approval; ethics and funding		Awaiting funding
Telehealth-based parental dental health education by community child health nurses in the prevention of early childhood caries in the ORIGINS community: a pilot randomised control trial (pilot)	Observational	Education initiative	Awaiting ethics and funding		Awaiting funding
Plastic Compounds: Is early life exposure to plastic compounds linked with increased risk of allergy in young children?	Observational	Early life exposures and allergies	Awaiting SC and PM approval; ethics and funding		Awaiting funding
Determining prenatal and postnatal environmental exposures that alter lung function in early life	Observational	Pollutants in the environment and lung health	Awaiting SC and PM approval; ethics and funding		Awaiting funding
Age-dependent oral microbiota development and diversity, and prediction of early childhood caries using next generation sequencing - Phase I	Observational	Characteristics of early childhood tooth decay	Awaiting SC and PM approval; ethics and funding		Awaiting funding
TOTAL VALUE					\$4,741,405

ORIGINS SUB-PROJECTS IN THE PIPELINE: IN DETAIL

Origins of neuro-developmental risk and resilience: Examining neurodevelopmental trajectories of infants in the ORIGINS cohort

This research will examine neurodevelopmental trajectories in the first two years of life among infants in the ORIGINS cohort. The primary aims are twofold: (1) to analyse whether different “classes” of neurodevelopmental trajectories emerge in the first two years of life (e.g. normal, delayed, very delayed); and (2) to examine child, family and social risk factors as predictors of infant neurodevelopmental trajectories. Findings from this research have the potential to identify novel biological and behavioural markers of impairment and inform earlier detection of infants at risk of neurodevelopmental delay or disorder using a developmental screener already in routine use in community health settings (the ASQ-3).

The CUB (Communicating and Understanding your Baby) Study

The aim of this study is to trial a new, parent-mediated, video-aided feedback therapy called VIPP. This therapy aims to optimise social and communication development in infants aged 9-14 months by helping parents understand and adapt to their infant’s communication style. The project will recruit 120 pregnant women (and their partners) who have a family history of autism, ADHD or intellectual disability. Half of the women (and their partners, and resulting infants) will receive the new program, and half of the women will receive community care as usual. Infant development will be measured at 6, 12 and 24 months of age. Outcomes will inform how best to support early social and communication development in infants showing early delays.

The AERIAL Study: Airway Epithelium Respiratory Illnesses and Allergy

AERIAL will investigate the consequences of a vulnerable respiratory epithelium at birth. The study will look at epithelial cells in the nose to determine any gene signature patterns which may predict the development of wheeze, allergy and asthma later in childhood. Placenta samples will be collected at birth along with a newborn nose epithelial brush sample. Participants will need to undertake daily temperature checks with their child, until one year of age, and data will be collected via an app. A nose swab will also be collected every three months.

Mums Minds Matter (pilot)

This RCT aims to pilot three 8-week intervention conditions (one mindfulness-based training program, one self-compassion-based training program, and one relaxation intervention) and measure effects on symptoms of maternal distress (i.e. symptoms of stress, anxiety, and depression) during pregnancy and maternal self-compassion, mindfulness, and emotion regulation. All intervention conditions will be minimal contact, meaning that participants will use online and printed resources at home to practice mindfulness, self-compassion, or the relaxation condition. Participants in all three conditions will receive a phone-call once a week to ask them how their practice is going and encourage them to complete a brief weekly assessment of practice and wellbeing.

The BioMood study: A pilot study assessing the association between Mediterranean diet (MD), microbiome, metabolome, inflammation and mental health during pregnancy (pilot)

The BioMood project is a retrospective study, which will examine the effect of maternal adherence to a Mediterranean Diet on microbiome and metabolome composition as well as inflammatory markers. It is hypothesised that in accordance with existing literature, a MD pattern will favour a beneficial microbiome and metabolome composition and reduce peripheral inflammation. Existing biological samples from ORIGINS participants during pregnancy, along with questionnaire data, will be used. Additional data comprising the Mental Health Continuum Short Form (MHC-SF) will be obtained at the three-year follow up visit and retrospectively to indicate recalled mental health during pregnancy. Findings will inform the implementation of therapeutic interventions such as modified dietary patterns, that have the potential to improve population health outcomes.



Time out for wellbeing

This project aims to determine if pregnant women's willingness to engage in online wellbeing programs varies across different online wellbeing program types. Time Out for Wellbeing will assess barriers and facilitators described by pregnant women that influence willingness to engage in different types of online wellbeing antenatal programs. Participants will be randomly allocated to one of three e-interventions and asked to complete a short-form survey that will assess their willingness to engage in/use the intervention, barriers, facilitators and attitudes to participation. Following survey completion, if participants have indicated interest to participate in their wellbeing condition, they will be provided with a link to Mums Minds Matter information for either mindfulness, self-compassion or relaxation information. Data will be collected on who opens the links and downloads information.

Machine Learning: Personalised, machine learning based prediction of asthma and allergies in WA

Asthma is the most common chronic lung disease of childhood. Therefore, there has been a worldwide effort to develop ways to identify asthma risk as early as possible to prevent disease. This study aims to show that asthma and allergies in individuals can be predicted before they occur based on individual family history and information on the early environment. The project will initially use existing data from the Raine Study, with ORIGINS as a validation cohort. Data driven, machine learning methods will be used to develop an assistive, questionnaire based diagnostic tool, to help clinicians in the prediction and prevention of asthma and allergy at an early age. A predictive model of asthma and allergies based on questionnaire data and family history may help doctors make decisions quickly in a cost-efficient way.

Kindy readiness in the ORIGINS cohort

The aim of this study is to provide an opportunity to review the development and wellbeing of children prior to them commencing kindergarten and/or an early learning environment. Recruitment will occur when children are close to three years of age. Participants will complete an online survey including the Ages and Stages Questionnaire, an assessment of child behaviour (Conners Early Childhood), and further questions about current health and medical history. Feedback will be provided on development, wellbeing, and preschool readiness.

BEACHES (Built Environments And Child Health in WaEs and AuStralia)

This research will bring together five large UK and Australian cohort studies to understand how complex and interacting built environment (BE) factors influence modifiable risk factors (physical inactivity, sedentary time, unhealthy diet) for non-communicable diseases across childhood. This will provide a unique opportunity to identify aspects of the BE that are common across settings, but also explore how the contrasting physical, cultural and policy environments may act to mediate BE effects. A better understanding of how the BE drives obesity in children will inform evidence-based planning policy and practice strategies to prevent the rise in non-communicable diseases in future generations.

Onset of severe RSV bronchiolitis due to identified maternal or environmental viral transmission (ORBIT) Study

In this study delineation of the cellular location of RSV during maternal transmission will occur using flow cytometry and RSV PCR analysis of maternal bloods during pregnancy and at birth. The impact of RSV in-utero exposure on RSV antibody responses will be measured in subsequent newborns born in winter and non-winter months until three years. These findings will allow the identification of the best window and target cell populations for intervention in the mother and newborn, as well as the most effective times for maternal RSV vaccine scheduling.

An intervention to enhance psychological wellbeing in families from pregnancy to infancy (pilot)

This study aims to develop and evaluate the efficacy of an enhanced version of Family Foundations. Family Foundations is a universal prevention and early intervention program designed to improve the co-parenting relationship, which has also been shown to reduce depression and anxiety in parents and enhance wellbeing in infants during the perinatal period. Couples will participate in enhanced Family Foundations during their third trimester of pregnancy and following the birth of their child. The sample of recruited participants will be relatively homogenous, comprised of couples with a relatively similar age, education, and income level. After birth, infants will also be present during the online sessions.

A Respectful Approach to early parenting

This RCT will conduct and evaluate a pilot study of infant and toddler group classes and parent discussion sessions based on a 'Respectful Approach' to early parenting. This approach places emphasis on the parent developing a cooperative relationship with their child from the start of life, through sensitive observation and trust in the child's capabilities. 'Respectful Approach' education classes will run weekly for eight weeks at baseline (when children are approximately four months old), and again after the first intervention period when children are approximately six months old. Likewise, assessments will also be done pre and post a second intervention period (when children are approximately 12 months old). The project aims to determine how participation in this intervention effects the parent-child relationship, parent confidence, parental stress, and child outcomes compared to a control group.

The COCOON Study: The COvid COmmunity compassiON study, assessing virus transmission and impact on the wellbeing of the ORIGINS Community

The COCOON study will follow 250 families (~1000 participants) for 6 months. Immunity to the new coronavirus will be determined at the beginning of the study and then again assessed at three and six months. This study will use a specifically developed app to help families record their daily temperatures and symptoms and if required alert the research team to contact families for follow-up testing for respiratory viruses including the new coronavirus. The app will also help review the health and wellbeing of families by prompting weekly questions.

Contribution of a novel mast cell subset to development of atopic disease

This project will compare how mast cells are "programmed" in allergic and non-allergic children as they migrate throughout the body at one year of age. This is a collaborative project between allergy and immune researchers at Telethon Kids Institute in Perth and Bioinformatic mast cell researchers in Singapore. By collaborating on this project, the investigators will be able to explore new aspects of how these important cells contribute to allergic disease in children.

Nature play and grow (pilot)

There is evidence to suggest that time spent in nature is associated with better health and wellbeing in children. This study will assess whether connecting families to nature has a positive influence on physical activity, diet, sleep and emotional wellbeing in young children. A group-based intervention will consist of ten 90-minute sessions delivered weekly. Each session will include a component related to healthy eating, physical activity/sedentary behaviours and connectedness to nature, with the aim of providing parents with knowledge and skills to support their child's healthy lifestyle. Findings from this pilot study will inform a future RCT of the intervention. The results will also be key in developing evidence-based recommendations for caregivers regarding the promotion of healthy lifestyles in children through connectedness to nature.

Facing the ORIGINS of health and disease (FACE)

Intrinsic diagnostic information resides in facial data, particularly when acquired with deep and 3-dimensional precision. This project will capture 3D facial imaging, creating a precise objective analysis of facial features that can be used to accurately phenotype an individual to develop facial signatures for rare and common conditions and to monitor treatment and trials. It is proposed that photos will be taken at the one, three and five-year appointments. Findings will accelerate translation of multi-omic diagnostics and treatment monitoring for those living with genetic and rare disorders and syndromes.

Helping new mums to be better breastfeeders – before their babies are even born (ACE – Infant Feeding)

Despite almost all Australian women initiating breastfeeding, formula is commonly given over the hospital stay. By three months, one third of new mothers have ceased breastfeeding altogether. Many mothers introduce formula due to a perception of poor milk supply, when in fact less than 5% of mothers are at risk of this problem. This study proposes to explore a novel intervention to determine the feasibility of teaching pregnant women antenatal colostrum expression (ACE) from 37 weeks gestation using an online link to an instructional video. This will be compared to ACE instruction from a midwife, along with a control group. If successful, this project will provide the platform for routinely teaching ACE using an easy method that can readily be incorporated into routine antenatal practice.



Maternal beneficial microbiota reduces infections and allergic diseases by epigenetic changes involved in ‘trained immunity’

This study will examine whether prebiotic supplementation during pregnancy benefits the development of the foetal immune system through the maternal gut microbiota and/or their metabolites. It will also be determined if the changes in the development of the immunological adaptation of the innate immune cells are associated with SCFAs levels and are mediated by epigenetic changes. This study will contribute to a better understanding of nutritional-microbial-programming of immune health, nutritional-microbial-epigenetics and the biological processes, sensitive to nutritional-microbial exposures in utero. Outcomes may lead to dietary strategies that provide more tolerogenic conditions during early immune programming and reduce the burden of many inflammatory disease.

Telehealth-based parental dental health education by community child health nurses in the prevention of early childhood caries in the ORIGINS community: a pilot randomised control trial (pilot)

Early interventions such as parental dental health education, that affect appropriate dietary and oral hygiene practices, could have a significant influence on the child’s oral health and reduce the occurrence of early childhood carries (ECC). This pilot study aims to evaluate a novel telehealth-based parental dental health education initiative delivered by trained child health nurses for the prevention and reduction of ECC in preschool children, relative to the gold standard home visit and routine dental care. Families will be recruited when children are aged 14-16 months and followed until children are five years of age to assess early life exposure and their influence on the child’s development and health.

Plastic compounds: Is early life exposure to plastic compounds linked with increased risk of allergy in young children?

Plastic products are ubiquitous in the general environment. Plastic can break down into smaller particles, micro- and nano-plastics, and release chemical by-products, such as phthalates and bisphenols. Humans are exposed to these chemical by-products and studies show they can affect various health outcomes, including asthma and allergies in children. Foetal exposure will be determined by measuring the chemical by-products in urine samples from pregnant mothers collected at both 22- and 36-weeks gestation. Exposure data measured in this study will be available for future studies of early life exposures and other childhood diseases.

Determining prenatal and postnatal environmental exposures that alter lung function in early life

Early-life exposure to pollutants in the environment has long-term effects on lung health. Lung function measured in early-life tracks throughout life and may determine individuals at risk of developing lung diseases such as asthma. This study will contribute to a better understanding of the most important environmental pollutants that affect the lung and when the effects occur (i.e. pregnancy or in early childhood), in order to provide information to families on which pollutants should be reduced and when this should occur.

Age-dependent oral microbiota development and diversity, and prediction of early childhood caries using next generation sequencing - Phase I

Dental decay in early childhood is a highly prevalent disease with a large effect on families and society. Prevention and early intervention are important in the management of dental decay. A better understanding of the microorganisms present in the mouth is needed to prevent and treat dental decay. This study will investigate the development of microorganisms including bacteria and fungi in the mouth in early years of life using saliva and new gene technologies. The findings of this study might facilitate a more effective strategy for the management of early childhood dental decay and provide a platform for additional studies including a microbiome gene catalogue from children with early childhood decay.

APPENDIX 3: STAKEHOLDER ENGAGEMENT

The ORIGINS Project works with a wide range of local, national and international collaborators, developing opportunities for networking, community engagement, research collaborations and guidance for student projects and supervision.

RESEARCH GROUPS/ACADEMIC INSTITUTIONS

Local Collaborations

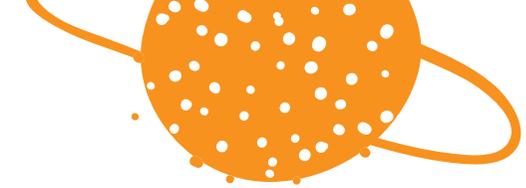
- Telethon Kids Institute
- Edith Cowan University
- Notre Dame
- Raine Study
- Childhood Allergy Immunology Research
- Fiona Stanley Hospital
- Joondalup Health Campus
- Curtin University
- Harry Perkins
- CoLab (Collaborate for Kids, TKI)
- Wesfarmers Centre of Vaccines & Infectious Diseases
- King Edward Memorial Hospital
- The University of Western Australia
- Murdoch University
- WA Health Translation Network
- Autism Research, TKI
- Busselton Health Study
- WA Phenome Centre

National Collaborations

- GenV (Murdoch Children's Research Institution)
- Best Start South West Sydney
- CHILD Cohort Study
- Queensland Family Cohort Study
- Barwon Infant Study
- Australasian Biospecimen Network Association (ABNA)
- Gomerioi gaaynggal
- InVIVO Planetary Health
- Born in SA
- New1000, University of Newcastle

International Collaborations

- Rotterdam Study / Generation R
- The Japan Environment and Children's Study (JECS)
- University of Southampton
- Ingham Institute
- Johnson & Johnson
- Born in Bradford



SERVICE PROVIDERS

- Ngala
- Child and Parent Centre, Banksia Grove
- Perth Pregnancy Centre
- Lions Eye Institute
- Perth Radiological Clinic
- Meerilinga
- Playgroup WA
- Child and Parent Centre, Roseworth
- STORK Pregnancy and Newborn Care
- HeraMED
- WA Primary Health Alliance
- Fertility North
- Parenting Connection, North West Metro
- Nature Play WA
- Pregnancy to Parenthood Clinic
- Western Diagnostic Pathology
- WA Child & Adolescent Community Health
- One for Women maternity service

COMMUNITY GROUPS

- Wanneroo and Surrounds Early Years (WASEY) Network
- City of Joondalup
- Strong & Deadly Mob
- NatureLink Perth
- Mirrabooka Early Years Group
- Consumer & Community Health Research Network
- Fathering Project
- City of Wanneroo
- Health Engagement Network
- Perinatal Infant and Mental Health Network

ACTIVITIES

Visits and presentations to 10 GP clinics in the Wanneroo and Joondalup area, including:

- Glengarry Medical Centre
- Currambine Family Practices
- Joondalup Drive Medical Centre
- Padbury Family Practice
- Brighton Beach Medical Centre
- GP West
- Ocean Keys Family Practice
- Butler Village Medical Centre
- Gateway Centre Health
- Ocean Reef Medical Centre

Lab tour of Telethon Kids & ORIGINS Project information session with JHC maternity staff

Regular attendance & presentation on ORIGINS at JHC Study Days with maternity staff

Participant & Consumer Reference Groups

Participation in and regular attendance at the Wanneroo and Surrounds Early Years Network meetings

Participation in the Communities for Children, Mirrabooka Advisory Group

Participation in the Banksia Grove Child & Parent Centre, Local Advisory Committee

Participation in and regular attendance at the Ngala Research Group

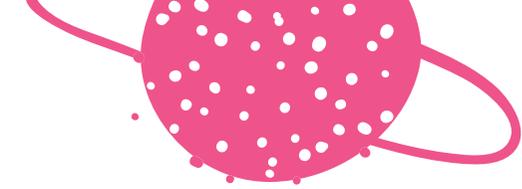
Family engagement: 1, 2 and 3-year birthday cards and ORIGINS promotional items

Launch of the quarterly ORIGINS Project Team Happy Hour Celebrations

APPENDIX 4: RESEARCH DISSEMINATION

PAPERS AND PUBLICATIONS (2019/2020)

1. Brosseau C, Selle A, Palmer D, Prescott S, Barbarot S, Bodinier M. Probiotics: Mechanisms and Preventive Effects in Allergy. *Nutrients*. 2019;11(8):1841. doi:10.3390/nu11081841
2. Finlay-Jones, A., Davis, J., O'Donovan, A., Kottampally, K. Comparing online mindfulness and loving-kindness/compassion training for promoting wellbeing in pregnancy: Protocol for a three-arm pilot randomized controlled trial (Preprint): DO - 10.2196/preprints.19803
3. Hagemann, E., Colvin, L. J., Gibson, L., Miller, S., Palmer, D. J., Jois, S., ... Prescott, S. L. (2018). The ORIGINS Project. In M. Hanson, & H. Fukuoka (Eds.), *Pre-emptive medicine: Public health aspects of developmental origins of health and disease* (Vol. 0, pp. 99-116). (Current Topics in Environmental Health and Preventive Medicine). Springer. <https://doi.org/10.1007/978-981-13-2194-8>
4. Hood, R., Zabatiero, J., Silva, D. "There's good and bad": Parent perspectives on the influence of mobile touch screen device use on prenatal attachment: Screen ORIGINS: Qualitative investigation of parental views and practices regarding screen technology use by families and young children.
5. Huang, R., Silva, D., Beilin, L., Neppe, C., Mackie, K., Roffey, E., Prescott, S. Feasibility of conducting an early pregnancy diet and lifestyle e-health intervention: The Pregnancy Lifestyle Activity Nutrition (PLAN) project. *Journal of Developmental Origins of Health and Disease*. 2020; 11(1), 58-70. doi:10.1017/S2040174419000400
6. Larcombe, D.L., Van Etten, E., Logan, A., Prescott, S.L., Horwitz, P. High-Rise Apartments and Urban Mental Health—Historical and Contemporary Views. *Challenges*. 2019; 10, 34.
7. Leffler, J., Gamez, C., Jones, A.P, Rueter, K., Read, J., Siafarikas, A., Lim, E.M., Noakes, P.S, Prescott, S.L., Stumbles, P.A., Palmer, D.J., Strickland, D.H. Early infancy vitamin D supplementation does not impact development of atopy-associated immune cell profiles. In press May 2020
8. Logan, A.C., Prescott, S.L., Katz, D.L. Golden Age of Medicine 2.0: Lifestyle Medicine and Planetary Health Prioritized. *Journal Lifestyle Medicine*. 2019; 9(2) 75-91
9. Prescott, S.L. Allergy as a sentinel measure of planetary health and biodiversity loss. *Allergy*, accepted February 2020
10. Prescott, S.L., Bland, J. Spaceship Earth Revisited: The Co-Benefits of Overcoming Biological Extinction of Experience at the Level of Person, Place and Planet Susan L. Prescott and Jeffrey S. Bland. *International Journal Environmental Res Pub Health (IJERPH)*. Accepted February 2020
11. Prescott, S.L., Hancock, T., Bland, J., van den Bosch, M., Jansson, J. K., Johnson, C.C., Kondo, M., Katz, D., Kort, R., Kozyrskyj, A., Logan, A.C., Lowry, C.A., Nanan, R., Poland, B., Robinson, J., Schroeck, N., Sinkkonen, A., Springmann, M., Wright, R.O., Wegienka, G. Eighth Annual Conference of inVIVO Planetary Health. Challenges to Opportunities. *IJERPH* 2019, 16:21
12. Pretorius, R.A, Bodinier, M, Prescott, S.L., Palmer, D.J. Maternal Fibre Dietary Intakes during Pregnancy and Infant Allergic Disease. *Nutrients*. 2019; 11, 1767
13. Rekima, A., Bonnard, C., Metcalfe, J., Tulic, M.K, Macchiaverni, P., Genuneit, J., Halloin, N., Zanelli, S., Maderios, S., Palmer, D., Prescott, S., Verhasselt, V. A role for early oral exposure to house dust mite proteases allergens through breast milk in food allergy susceptibility. *Journal of Allergy Clinical Immunology*. 2020; 145(5):1416-1429. PMID: 31954775
14. Rueter, K., Black, L., Jones, A., Bulsara, M., Clarke, M.W., Gamez, C., Lim, E.M, Palmer, D.J., Prescott, S.L., Siafarikas, A. Analytical bias in the measurement of plasma 25-hydroxyvitamin D concentrations in infants. *International Journal of Environmental Res. Public Health*. 2020; 17(2).
15. Rueter, K., Jones, A., Siafarikas, A., Bear, N., Lim, E.M., Noakes, P., Prescott, S.L., Palmer, D.J. The effect of vitamin D and UV-light-exposure on immune development in infancy. *Allergy*. 2019; Aug 1 (Vol. 74, pp. 241-241), 111 RIVER ST, HOBOKEN 07030-5774, NJ USA: WILEY



16. Silva, D., Hagemann, E., Davis, J., Gibson, L., Jois, R., Colvin, L., Prescott, S. (Under Review). The ORIGINS Project: a community-based interventional birth cohort. *Reviews on Environmental Health*
17. Verhasselt, V., Genuneit, J., Metcalfe, J. R., Tulic, M.K., Rekima, A., Palmer, D.J., Prescott, S.L. Ovalbumin in breastmilk is associated with a decreased risk of IgE-mediated egg allergy in children. *Allergy*. 2020; 75(6):1463-1466. PMID: 31808162
18. Valsamma Eapen, Susan Woolfenden, Susan L. Prescott, Antonio Mendoza Diaz and Mark Dadds. (2020). Early life determinants of Health: Invest early to break the cycle of long-term disadvantage. In: *Starting at the Beginning: Laying the Foundation for Lifelong Mental Health* (Eds. Matthew Hodes, Susan Shur-Fen Gau, and Petrus De Vries Petrus J. de Vries), Elsevier. pg 61-97

POSTER PRESENTATIONS

- Six poster presentations at the 2019 Developmental Origins DOHaD ANZ conference in Melbourne (October, 2019): DOHaD 2019:
 - *'The Development Phase of a Decade Long Pregnancy Intervention Cohort'* – Silva, D.
 - *'Time for Change: The ORIGINS Project Leading a New Generation of Interventional Birth Cohorts'* – Hagemann, E.
 - *'Making Inclusive Positive Change: Bridging the Challenges Project'* – Davis, J.
 - *'Harmonising Data Across Multiple Cohort Studies; From Local to Global'* – Davis, J.
 - *'Involving Consumers in a Cohort Study'* – Gibson, L.
 - *'Nature Play & Grow: Promoting healthy eating, unstructured play and planetary responsibility by connecting preschool children to nature'* – Gibson, L.

ORAL PRESENTATIONS (KEYNOTE & PLENARY SPEAKER)

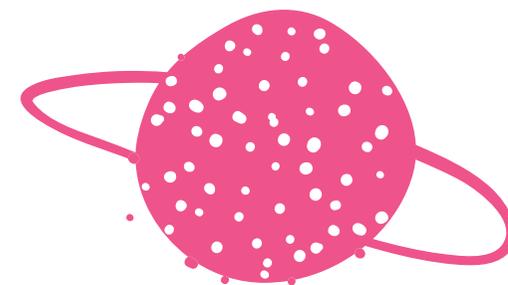
- Keynote Speaker: Institute of Functional Medicine, Phoenix, June 2020 (Changed to Virtual Platform) – Prescott, S. L.
- Keynote Speaker: Congress of the Royal Australian NZ and Australian College of Psychiatrists, Hobart, May 2020 – Prescott, S. L.
- Plenary Speaker: Seventh Annual Personalized Lifestyle Medicine Thought Leaders Consortium, October 2019, Washington Seattle – Prescott, S. L.
- Plenary Speaker: Australian Society of Immunology, Adelaide, December 2019 – Prescott, S. L.
- Plenary Speaker: Eighth Annual Personalized Lifestyle Medicine Thought Leaders Consortium, October 2020, Washington Seattle – Prescott, S. L.
- Keynote Speaker: John P. McGovern Memorial Lecture. American College of Allergy, Asthma, and Clinical Immunology, Houston Texas, November 2019 – Prescott, S. L.

INVITED PRESENTATIONS (INCLUSION OF THE ORIGINS PROJECT AT ALL SESSIONS)

- Invited Speaker: The Institute for Integrative Health, February 3-4, 2020 Baltimore, USA – Prescott, S. L.
- Invited speaker: 2019 International DOHaD Congress, Melbourne, Australia (October 2019) – Prescott, S. L.
- Invited to present at Community Child Health Nurse Presentations: *The ORIGINS Project - Update & General Movement Disorder* – Silva, D.
- Invited to present at WA Child and Adolescent Community Health Executive Group: *Update of ORIGINS and Opportunities to Collaborate* – Silva, D.
- Invited to present at the University of Notre Dame, Fremantle, Western Australia: *ORIGINS Update & Collaboration Opportunities* – Silva, D.
- Invited to present at Wesfarmers Centre Vaccines & Infectious Diseases Institute Seminar – Prescott, S.L, Silva, D., Davis, J.
- Invited speaker: The 18th International Conference of the Pacific Basin Consortium for Environment and Health – Assessing and Mitigating Environmental Exposures in Early Life. 16-19 September 2019 Kyoto, Japan. *Plenary 1: Longitudinal Birth Cohorts in the Asia-Pacific region, Title: The ORIGINS project: An Intervention Birth cohort to restore global health* – Silva, D.

PRESENTATIONS AT EDUCATION EVENTS AND COLLABORATOR MEETINGS

- Perth Pregnancy Centre (Community Antenatal Provider): *'The ORIGINS Project Update'* – Silva, D.
- The ORIGINS Project & WAPHA GP Liaison – Gibson, L.
- ORIGINS & Nature Play: *Kings Park Bridge* – Prescott, S.
- Director of Obstetrics & Dr Cliff Neppe: *JHC GP Engagement* – Gibson, L.
- Perinatal Infant & Mental Health Network, Clarkson: *'The ORIGINS Project Update'* – Gibson, L.
- The Strong and Deadly Mob: *'The ORIGINS Project Update'* – Gibson, L.
- Quinns Mindarie Playgroup: *'The ORIGINS Project Update'* – Gibson, L.
- Mayor of Joondalup – Albert Jacobs: *'The ORIGINS Project Update'* – Gibson, L.
- ISHAR Multicultural Women's Health Centre: *'The ORIGINS Project Update'* – Gibson, L.
- Colin Pettit Commissioner for Children & Young People- *'The ORIGINS Project Update'* – Davis, J., Silva, D., Prescott, S., Hagemann, E., Gibson, L., D'Vaz, N., Ng, M.
- Wesfarmers Centre Management Committee Meeting: *'The ORIGINS Project'* – Prescott, S.L, Silva, D., Davis, J.
- Raphael Centre: *'The ORIGINS Project'* – Davis, J., Gibson, L., Hagemann, E., D'Vaz, N., Ng, M., Silva, D., Prescott, S.
- Perth Immunology Group: *'The ORIGINS Project'* – Davis, J., Silva, D., Prescott, S.
- Women's Health Strategy & Programs: *'The ORIGINS Project'* – Davis, J., Silva, D.,
- GP Education Evening: *'The ORIGINS Project'* – Silva, D.
- JHC Paediatric Education Day: *'The ORIGINS Project'* – Silva, D.
- Aspen Nutritional Educational Conference: *'The ORIGINS Project'* – Silva, D.
- WA Health Promotion (Healthway) – *"Nature Play & Grow: Nature connectedness as a way to improve child health and wellbeing" (including an overview of The ORIGINS Project)* – Gibson, L
- TKI CONNECT Community Discussion – *"Consumer & Community Involvement in The ORIGINS Project"* – Gibson, L.





STUDENT PROJECTS

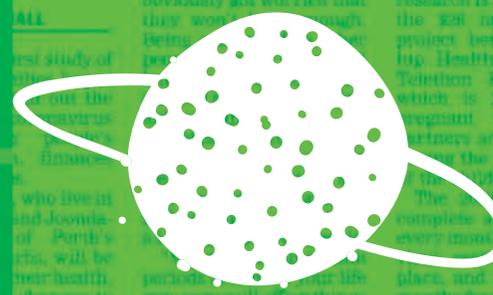
During this reporting period there have been 2 undergraduate students, 3 MD students, 1 Masters student, and 11 PhD candidates involved with The ORIGINS Project directly or associated with one of the nested sub-projects.

Biomedical Science Practicum (Undergraduate)	The influence of the gut and placental microbiome on mental health	University of Notre Dame
Biomedical Science Practicum (Undergraduate)	The placental microbiome	University of Notre Dame
MD Elective placement		University of Western Australia
MD	The impact of a Mediterranean diet in pregnancy on and neonatal body fat composition	Oceania University of Medicine
MD	Impact of physical activity in pregnancy on maternal gestational weight gain, neonatal body fat composition and weight of the infant at 1 year of age	Oceania University of Medicine
Masters	Associations between sunlight exposure, skin pH and permeability in pregnancy	Edith Cowan University
PhD	A pilot study of a behavioural intervention for increasing the quality of parent-baby social interactions in the first 6 months of life	University of Western Australia
PhD	Antenatal wellbeing training to enhance emotional assets in mothers and their offspring: exploring the experience and engagement of pregnant women	University of Western Australia
PhD	Developing and assessing the efficacy of an intervention to enhance psychological wellbeing in families from pregnancy to infancy	Curtin University
PhD	Family mobile touch screen device use and child development: The role of parent-child attachment	Curtin University
PhD	Molecular investigation of the developing microbiome	Curtin University
PhD	Understanding prenatal brain growth in relation to later neurocognitive development: What are the key linking mechanisms?	University of Western Australia
PhD	Water Quality and the Microbiome Study (TUMS)	University of Western Australia
PhD	Personalised, machine learning based prediction of asthma and allergies in Western Australia	University of Western Australia
PhD	Dietary fibre intake during pregnancy, pregnancy condition, birth outcome and early inflammation	University of Western Australia
PhD	A respectful approach to early parenting	Edith Cowan University
PhD	Machine learning and obstetric ultrasound: improving fetal central nervous system measurement for TALK clinical research	Edith Cowan University



APPENDIX 5: ORIGINS IN THE MEDIA

originsproject.telethonkids.org.au





MEDIA HIGHLIGHTS 2019-2020

Media Outlets

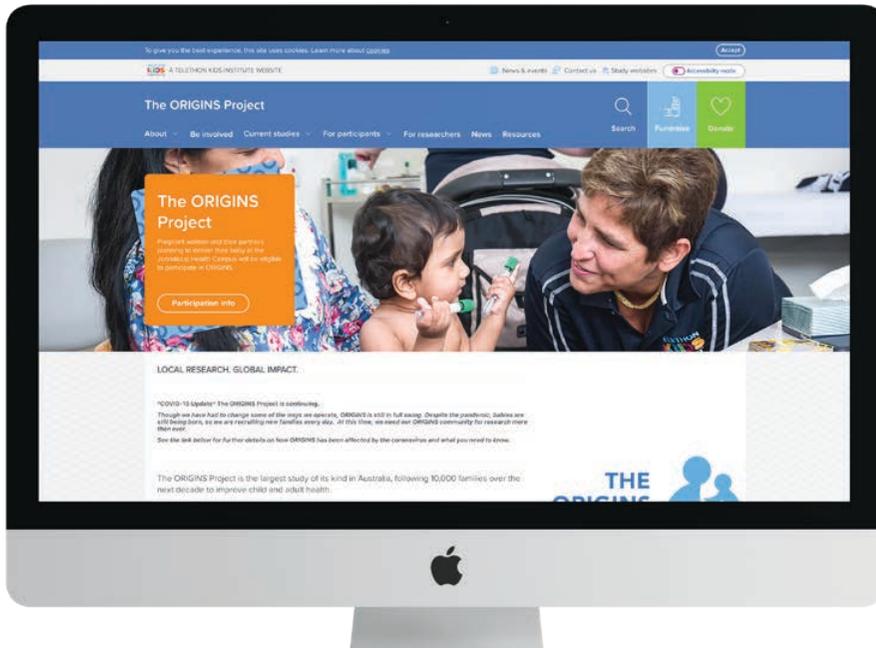
- JHC Facebook Page and website
- Channel 7 News
- National Tribune Newspaper
- The Sector website
- CEO Magazine
- The West Australian Newspaper
- ABC Radio Perth
- 6PR Radio
- Channel 7 Flashpoint
- Perth Now website
- Joondalup, Wanneroo & Stirling Times
- House & Garden Magazine

Topics & Stories

- ORIGINS Highlights and milestones
- Various new sub-projects
- ORIGINS Biobank
- ORIGINS Team expertise, i.e.: pregnancy and heat, ADHD, baby milestones, microbiome
- COVID-19 advice for families and pregnant women
- Community Wellbeing and COVID-19 project
- ORIGINS and allergies

Online Media

- The ORIGINS PROJECT frequently featured on the Telethon Kids Institute Facebook, Instagram and Twitter social media channels.
- The ORIGINS Project website was a source of information for the general public, participants and potential participants. During the COVID-19 pandemic, the website was used to update participants on changes to protocols, and also provided general coronavirus advice and tips to families during uncertain times.





THE ORIGINS PROJECT

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