



## ORIGINS Sub-Projects 2020-2021

Current & Completed Sub-Projects	Type	Impact/Focus	Status at 30 June 2021
The PLAN Project (pilot study): Pregnancy Lifestyle Activity and Nutrition	Randomised Controlled Trial	Overweight & obesity (mother and child)	Completed (57)
A family's journey at JHC: Analyses of routinely collected data	Observational	JHC mother and father profiling	Ongoing
Screen ORIGINS: Longitudinal study of the multidimensional influences and impacts of contemporary screen technology use over the first 5 years of life (quantitative & qualitative)	Observational	Technology use (family)	Quantitative & Qualitative
The SYMBA Study: Improving gut health (symbiosis) for allergy prevention	Randomised Controlled Trial	Reducing infant allergies	Recruitment ongoing
Testosterone and Language in Kids (TALK) Study	Observational	Cerebral lateralisation and early language development	Recruitment completed (501)
Cardiovascular Risk Evaluation in Expectant Fathers (CARE-Dads)	Observational	Cardiovascular and mental health of fathers	Completed (503)
NewbOrn nasal Sampling Evaluation (NOSE) Study (Pilot study of AERIAL)	Observational	Asthma risk	Completed (145)
Airway Epithelium Respiratory Illnesses and Allergy (AERIAL)	Observational	Asthma	Recruitment ongoing
Breastfeeding and Eating Nuts and Eggs For Infant Tolerance (BENEFIT) Trial	Randomised Controlled Trial	Reducing infant egg and peanut allergies	Recruitment Completed (108)
The Cashew Study: Introducing cashew nuts during infancy	Randomised Controlled Trial	Reducing infant cashew allergies	Recruitment completed (196)
The PrEggNut Study: A Maternal diet rich in eggs and peanuts to reduce food allergies	Randomised Controlled Trial	Reducing infant egg and peanut allergies	Recruitment ongoing
The Engage Study: Discovering and delighting in your baby (pilot)	Single arm intervention trial	Parenting education	Recruitment completed (13)
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 completed (50)
ADAPTS: Antibiotic Dysbiosis and Probiotics Trial in infants	Randomised Controlled Trial	Gut health	Recruitment completed (60)
TUMS: Water quality and the microbiome study	Randomised Controlled Trial	Microbiome	Recruitment completed (197)



Diabetes during pregnancy and subsequent child development: A 3-year follow-up study	Observational	Diabetes	Commencing data extraction
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 and body composition	Finalising analyses
ORIGINS Community Wellbeing during the COVID-19 Pandemic	Observational	Mental health during COVID-19	Ongoing
Breastmilk Allergy Prevention	Observational	Food allergies, prebiotics	Breastmilk analyses commenced
Early Moves	Observational	Neurodevelopmental assessment of general movements in babies	Ongoing
ACE Infant Feeding: Helping new mums to be better breastfeeders – before their babies are even born	Randomised Controlled Trial	Breastfeeding	Commencing recruitment
Built Environments And Child Health in WaEs and AuStralia (BEACHES)	Observational	Built environment, physical activity and childhood obesity	Commencing data extraction
The BioMood study: A PILOT study assessing the association between Mediterranean diet, microbiome, metabolome, inflammation and mental health during pregnancy	Observational	Diet, microbiome, inflammation and mental health	Commencing sample extraction
The COvid COMMunity compassiON study (COCOON): Assessing virus transmission, immunity development and wellbeing of families during COVID-19	Observational	COVID-19	Recruitment ongoing
CUB/Baby AICES - A randomised-controlled trial of a parent-mediated intervention for optimising social and communication development of newborns at increased familial risk of autism spectrum disorders	Randomised Controlled Trial	Parenting education and child development	Recruitment ongoing
Kindy Readiness: Preschool readiness in the ORIGINS cohort	Observational		Recruitment ongoing
Machine Learning: Personalised, machine learning based prediction of asthma and allergies in Western Australia	Observational	Asthma and allergy	Ongoing
Mast Cell: Contribution of a novel mast cell subset to development of atopic disease	Observational	Allergies	Sample collection ongoing
Mums Minds Matter: A three-arm pilot study of mindfulness vs self-compassion vs relaxation training for reducing stress and promoting wellbeing among pregnant women	Interventional	Maternal mental health	Recruitment ongoing
Time Out for Wellbeing: an experimental study linked to Mums Minds Matter	Observational	Maternal mental health	Recruitment ongoing
STORK: A pilot retrospective observational study to assess biomarkers of stress and serotonin pathways in pregnant women in The ORIGINS Project	Observational	Maternal mental health	Commencing sample extraction



Dental screening: Tele-screening for early childhood caries detection during COVID-19 pandemic	Observational	Oral health	Commencing recruitment
ORIGINS of Neurodevelopmental Risk and Resilience Project Amendments	Observational	Neurodevelopment	Commencing sample and data extraction

## ORIGINS “Live” Sub-Projects

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

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 web-based application 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 & 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 group (carbohydrate powder) taken once a day from 20 weeks gestation until their baby is 6 months. Participants (mother and baby) are followed up at 4-, 6- and 12-months post birth. At present, 315 1-year old’s have been seen, representing a 95% completion rate.

### 5. Testosterone and Language in Kids (TALK) Study

The TALK study is seeking to understanding 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 us to better understand how children acquire language and how we can 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 1 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 1 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 until 9 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 6 months to 1 year of age to determine dosage recommendations prior to a larger RCT. Recent Australian research has found that approximately 1 in 20 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 3 times per week) Group 2 (increasing from 1 teaspoon to 3 teaspoons 3 times per week) or Group 3 (no specific recommendations to introduce cashew nut spread). Recruitment is ongoing with 173 infants having completed their 1-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 4 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 4 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 6 months of life. The Engage Study commenced recruitment in April 2019 with a total of 14 families recruited into the study. The study involved 2 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 provide the outcomes of the 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 an 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 1 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 6 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 we treat tap water is optimised for promoting a healthy tum in early childhood.

#### **15. Diabetes during pregnancy and subsequent child development: A 3-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 3 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 1 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 1 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 1 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 the 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 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 2 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.

#### **20. ACE Infant Feeding: Helping new mums to be better breastfeeders – before their babies are even born**

The ACE Infant Feeding study aims to determine whether breastfeeding outcomes can be improved by teaching pregnant women how to hand express colostrum using a novel online instructional video. As a pilot study, it aims to determine the feasibility of teaching antenatal colostrum expression (ACE) via video, which may increase support to mothers and lead to improved breastfeeding rates, ultimately leading to improved public health outcomes.

#### **21. Airway Epithelium Respiratory Illnesses and Allergy (AERIAL)**

Recurring viral infections and atopy in early childhood, and certain exposures during pregnancy, are strong predictors of persistent asthma and/or long-term lung disease in adulthood. The research team has previously examined the cells lining the airways in the nose and lungs (epithelial cells) and found that these cells among children with asthma/wheeze do not form a tight barrier and heal slowly from injury. AERIAL will examine epithelial cells in placental samples to determine how exposures leave specific gene fingerprints, and how these relate to breathing outcomes in early life.

#### **22. Built Environments and Child Health in Wales and Australia (BEACHES)**

BEACHES examines how the built environment impacts obesity among children. It will examine 5 cohort studies in the United Kingdom and Australia to understand how complex and interacting built environment factors influence modifiable risk factors (physical inactivity, sedentary time, unhealthy diet) throughout childhood. The study will help to inform evidence-based planning policy and practice strategies to prevent the increase of non-communicable diseases.

**23. The BioMood study: A PILOT study assessing the association between Mediterranean diet, microbiome, metabolome, inflammation and mental health during pregnancy**

BioMood will examine if maternal adherence to a Mediterranean diet will lead to beneficial microbiome and metabolome composition and reduced inflammatory markers. It will also examine if beneficial gut microbiota is associated with positive mental health. An association between diet and positive mental health would support the importance of optimising maternal diet during pregnancy and may improve health outcomes at a population level.

**24. The Covid Community compassion study (COCOON): Assessing virus transmission, immunity development and wellbeing of families during COVID-19**

COCOON will follow 250 families for a 6-month period to understand how COVID-19 is impacting the ORIGINS cohort. The study will use an app to help families record health information, including COVID-19 symptoms, and alert the research team if any follow-up testing for respiratory viruses is required. The study will provide information to help guide policy and increase understanding of SARS-COV-2, the virus that causes COVID-19.

**25. CUB/Baby AICES - A randomised-controlled trial of a parent-mediated intervention for optimising social and communication development of newborns at increased familial risk of autism spectrum disorders**

The first 3 years of life is an important time for a child's brain development, and this development can be influenced by the quality of 'back and forth' interactions children have with parents/carers. CUB will test a new program designed to support baby brain development by providing parents/carers with information and skills to optimise 'back and forth' interactions.

**26. Kindy Readiness: Preschool readiness in the ORIGINS cohort**

A positive start to life can have impacts that last well beyond childhood, influencing future health, development, learning and wellbeing. The Kindy Readiness study aims to assess the development and wellbeing of all non-active participants enrolled in The ORIGINS Project to enable early identification, timely feedback and early intervention to vulnerable children prior to commencing preschool, kindergarten and/or an alternate early learning environment.

**27. Machine Learning: Personalised, machine learning based prediction of asthma and allergies in Western Australia**

Asthma is the most common chronic lung disease in childhood and is hard to diagnose in young children. The Machine Learning study aims to show that asthma and allergies can be predicted before they occur, based on family history and information the early environment. Using machine learning, the study aims to create personalised prediction scores for developing this disease, ultimately helping to prevent and manage asthma.

**28. Mast Cell: Contribution of a novel mast cell subset to development of atopic disease**

Allergies affect 1 in 5 Australian children and can be apparent within the first months of life through signs such as skin rashes or eczema. Mast cells form part of the body's immune response and are involved in the release of histamines, leading to most allergic symptoms (runny nose, itchiness, swelling, etc.). These cells may be a suitable target for new allergy drugs. This study will compare how mast cells are 'programmed' in allergic and non-allergic children as they migrate through the body.

**29. Mums Minds Matter: A three-arm pilot study of mindfulness vs self-compassion vs relaxation training for reducing stress and promoting wellbeing among pregnant women**

Mums Minds Matter is a pilot study comparing 3 8-week interventions and measuring the effects on maternal distress, self-compassion, mindfulness and emotion regulation. The 3 intervention types will be mindfulness-based training, self-compassion-based training, and a relaxation intervention; all intervention types will be home-based and provide resources in hardcopy and digital form. Improving mental health for pregnant women may improve maternal and child health.

**30. Time Out for Wellbeing: an experimental study linked to the Mums Minds Matter Project**

The perinatal period can be a stressful period, with many women experiencing depression during and/or after pregnancy. Evidence suggests that stress during this period can have negative health impacts on the mother and the mother-infant relationship. Time Out for Wellbeing aims to determine if pregnant women's willingness to engage in online wellbeing programs varies by program type. It will assess barriers and facilitators described by pregnant women that influence their willingness to engage in different types of online well-being antenatal programs.

**31. STORK: A pilot retrospective observational study to assess biomarkers of stress and serotonin pathways in pregnant women in The ORIGINS Project**

Traditionally, stress levels have been assessed through clinical assessments, which can be costly and inaccessible for some people, or self-reported questionnaires, which may be inaccurate and rely on participant literacy. Establishing a consistent, reliable measure of stress using biological markers could enable prevention and early intervention. Analysing hair is a relatively new strategy for measuring long-term cumulative cortisol levels. The STORK pilot study will analyse biomarkers in the hair of a sample of pregnant women, separated between those who score high and low on self-reported psychological scales, to determine if there is a correlation between self-reported measures and biological markers.



### **32. Dental screening: Tele-screening for early childhood caries detection during COVID-19 pandemic**

Dental decay is one of the most common causes of hospitalisation for children in Western Australia. Dental Screening aims to implement and validate a potentially cost-saving photographic method in remote dental screening for tooth decay in preschool children using a smartphone camera and store-and-forward telehealth as an alternative to a traditional visual dental inspection. This study may contribute to the prevention and early intervention of dental decay, leading to fewer dental-related hospitalisations for children and improved dental health.

### **33. ORIGINS of Neurodevelopmental Risk and Resilience Project Amendments**

Neurodevelopmental disorders, such as Autism Spectrum Disorder and Attention Deficit Hyperactivity Disorder, often go undetected until later infancy or early childhood and have lifelong impacts. This study aims to analyse whether different classes of neurodevelopmental trajectories emerge in the first two years of life and examine various risk factors. The identification of risk factors and early intervention have the best chance of improving impairments by capitalising on the neuroplasticity of infants' brains.

