

Winter 2024

NEWSLETTER

Welcome,

to the latest edition of our newsletter. We have exciting news to share with you that some of our study visits have moved to a new facility. There are also lovely new birthday card designs off the press!

In staff news we are delighted that Ray, TEBC research assistant will be taking up a new role within the study. PhD student, Rebekah, reported TEBC research findings at two conferences and was awarded the prize for best poster.

New research findings include that infants born preterm show differences in their immune system using new epigenetic scores, and, explore the relationships between the gut microbiota and brain development.

As always, huge thanks to everyone who helps us with our research, without your time and commitment none of it would be possible.

Warm wishes, The TEBC Team.

To mark World Prematurity Day, Theirworld released a video highlighting the research being carried out by TEBC.

[Premature babies study focuses on children's later learning challenges](#)



Things to do on winter days

We have ideas for indoors, outdoors and Christmas tree pops!

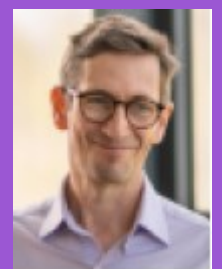


Staff News

Ray Amir (Research Assistant) is joining the team full time and will be leading on the 7 year visits. He is looking forward to seeing you!



James recently gave evidence to the House of Lords committee on preterm birth. The committee's report was published in November and is available here: [House of Lords - Preterm birth: reducing risks and improving lives - Preterm Birth Committee](#)



News

We have moved!

We have exciting news to share with you! After seven years of holding study visits at Kennedy Tower in Morningside, we have moved! It's still the same team (including Ray, Melissa and Rebekah) but you will now be invited to visit us at the research facility in the new Edinburgh Children's Hospital. You'll be met by the lovely reception staff.....



.....and wait in the nice, bright reception area that has toys and games.



We have the child lab all ready for you to come and play with us!



If your child also has an MRI scan, they will pop over to the research facility after the scan to complete some tasks. We still have lots of great snacks to choose from! Plus, free onsite parking and excellent public transport links. We can't wait to welcome you to our new home!

New birthday card designs



We have new birthday card designs, hot off the printer's press! A huge thank you to the children who created the designs when they came to the party earlier this year.

There are some amazing designs including rainbows, a mermaid and a house all decked out for a party, complete with a brain birthday cake!



If you have a birthday coming up look out for one of these landing on the mat!

Student success

PhD student, Rebekah Smikle, presented TEBC research findings at two conferences this year: the Neonatal Society's summer conference and the British Psychological Society conference.

Rebekah presented findings from the questionnaires that parents complete at the 2-year follow-up appointments. She found that at 2 years after preterm birth, parental report shows differences in toddlers' language development compared to term-born children, but no differences in attention and executive functions. Her project also showed that children's cognitive skills all seem to be related, such that parents rate children's language, attention and executive functions similarly at 2 years. Rebekah's research will continue to explore development using parental questionnaires compared to behavioural assessments at 5-year follow-up.

Rebekah was awarded the prize for Best Poster at the British Psychological Society!



Research Findings

We have published over 50 research papers using data from the study cohort. Summaries of all our published research findings are available on our study [website](#).

Infants born preterm show differences in their immune system using new epigenetic scores.

Background Information

Preterm birth, being born before your due date, can be associated with changes to brain development and challenges during childhood and beyond. A family's socioeconomic status (SES) describes a family's access to financial, educational, social, and health resources. Being born into a family affected by low SES can also be associated with difficulties in development.

Inflammation is the way the body's immune system responds to infection, injuries, and other experiences that can damage the body. Inflammation might be one way that preterm birth and low SES might affect development.

Epigenetic changes are ways that the environment and experiences affect how your genes in your DNA are used, without changing the DNA itself. Scientists have created epigenetics scores, known as EpiScores, for various proteins in the blood, and these EpiScores might be better than the proteins themselves for investigating how inflammation affects the body, particularly the brain. Within the Theirworld Edinburgh Birth Cohort, we have calculated these EpiScores using saliva samples taken when babies reached their due date.

We have previously shown that one of these EpiScores was associated with preterm birth, brain changes after preterm birth, and various illnesses we see in preterm-born infants.

Research question

We investigated whether preterm birth and low SES were associated with 104 EpiScores, including inflammation-related proteins.

Findings

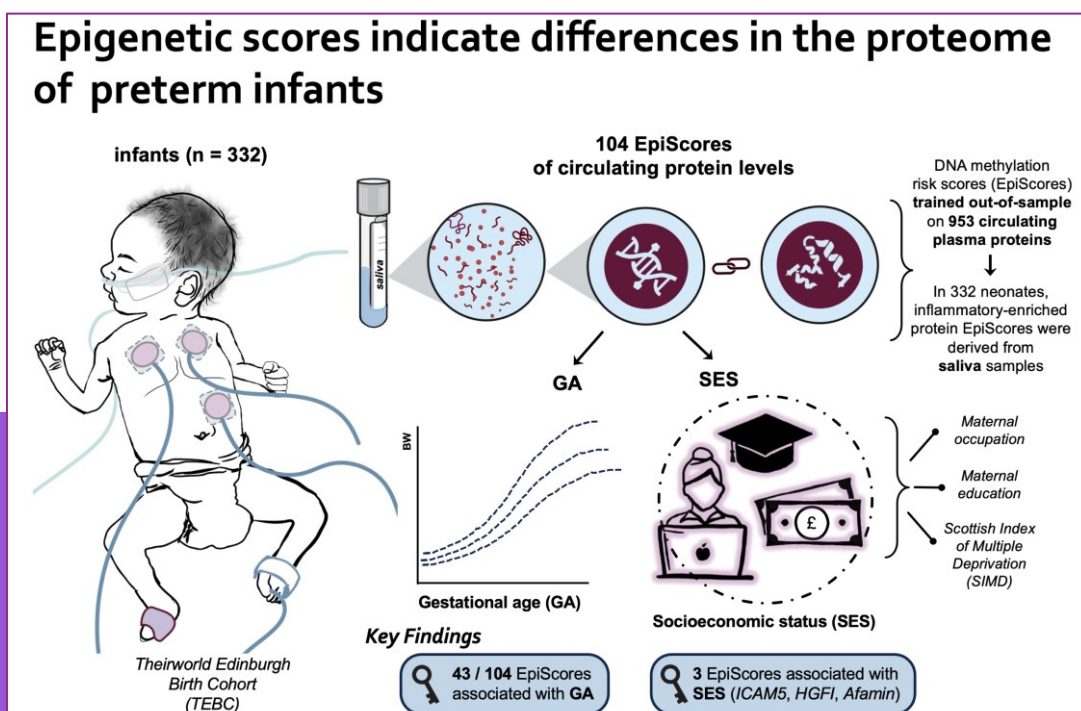
Preterm birth was linked to 43 EpiScores, representing proteins responsible for infection and inflammation responses, and development of the brain, blood vessels and other body systems.

Only three EpiScores were linked to low SES, and when we took into account the illnesses we see in infants born preterm, these links disappeared.

Conclusion

A range of proteins are linked to preterm birth – this helps us understand how the immune system is changed when babies are born early.

However, there are very few protein EpiScores linked to low SES, so it is unlikely that inflammation is the main reason why low SES affects the development of preterm infants in the neonatal period.



Relationships between the gut microbiota and brain development in preterm infants

Background information

After being born, trillions of microorganisms colonise our body of which the majority reside in our gut – this is called the gut microbiota and it is important for many physiological functions such as metabolism and immunity. The gut microbiota and the brain both develop rapidly in the first few years of life and there is accumulating evidence that the gut microbiota impacts neurodevelopment. For example, researchers have found links between gut microbiota composition and language and motor skills as well as temperament (Vaher et al. 2022 Dev Review). Preterm babies are exposed to microbes much earlier than their term-born peers, and during their first few months of life they are exposed to many factors that can influence their gut microbiota composition such as the hospital environment, antibiotic treatments, and combination of different milk types. However, very little is known about the relationships between the gut microbiota and brain development in this vulnerable group.

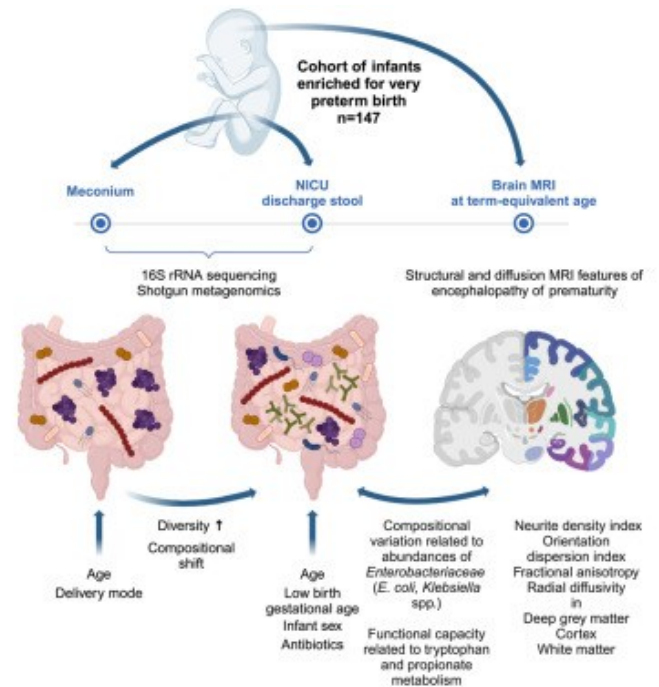
Research question

In this work we had three questions. First, how does preterm infant gut microbiota look like shortly after birth and shortly before discharge from the neonatal unit? Second, what are the clinical factors influencing gut microbiota composition? Third, how does the gut microbiota correlate with neurodevelopmental markers measured using brain MRI scans?

Findings

Shortly after birth, preterm infant guts had very low microbial diversity and most infants' microbiotas were dominated by single microbes, mainly *Staphylococcus*. Birth mode was the strongest influencer of the microbiota at this time. By the time of hospital discharge, the infant gut microbiotas had diversified and babies had varying microbiota compositions: some babies had high levels of *Bifidobacterium* while others had high abundances of bacteria belonging to the *Enterobacteriaceae* family such as *Klebsiella* and *Escherichia*.

The main factors impacting microbiota composition were low birth gestational age, antibiotics and infant sex. We then found that gut microbiota composition at the time of hospital discharge, particularly abundances of *Escherichia* and different *Klebsiella* bacteria, correlated with brain microstructure in the deep grey matter and the cortex.



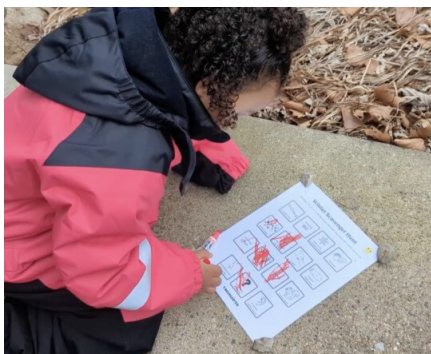
Conclusions and implications

This was the first study showing that preterm infant gut microbiota correlates with important brain MRI markers known to be affected by preterm birth. As the gut microbiota can be modified, for example by supplementing with pro- and prebiotics, it is an exciting avenue to promote brain health in preterm infants, but more research is needed to fully understand the linking mechanisms, design effective microbiota interventions, and find out who and when are most likely to benefit from these interventions.

You can find summaries of all the findings from TEBC cohort data on our website:

<https://www.ed.ac.uk/centre-reproductive-health/tebc/publications>

Things to do on winter days.



Winter Scavenger Hunt

Wrap up warm and get the kids outside! Connect with nature and improve their observation skills. Find all the clues in one go or keep looking over a few weeks. Download and print the scavenger hunt clues here or make up your own:

https://d2gesac5hma2c2.cloudfront.net/uploads/attachment/file/4212/Winter_Scavenger_Hunt_worksheet.pdf

Winter Hats Craft

When it's time to come indoors or it's a dreich day, get busy making these winter hat decorations. Print the template (or draw your own), get the kids to colour the hats or decorate with other things. They look good on their own or hang them on a string for a cute decoration!



What you will need:

- Hat template (<https://www.easypeasyandfun.com/winter-hats-craft-for-kids/>)
- Colouring pencils, crayons or felt tips.
- Cotton balls
- White school glue
- Scissors

Christmas Tree Pops

Decorate wedges of chocolate sponge with green icing and sweets to make festive cake pops on sticks - perfect for baking with kids.

<https://www.bbcgoodfood.com/recipes/christmas-tree-pops>



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<https://www.ed.ac.uk/centre-reproductive-health/tebc>