King's College London
centre for the developing brain
Guy's and St Thomas' NHS
NHS Foundation Trust

Spring Newsletter

March 2024, Volume 1, Issue 2

Brain, Immunity, and Psychopathology following very Preterm birth (BIPP)

Dear Reader,

Welcome to the second edition of our Newsletter series! We hope this gives you an idea of what we have been up to. We want to update you on recruitment as well as what we have been doing with the research we have conducted so far. We also want you to meet the new members of our team and say goodbye to a few who are leaving us. We hope you are doing well and will enjoy catching up with us.

Best wishes,

Prof Chiara Nosarti, Principal Investigator, and the BIPP Study Team

In this issue of the BIPP Newsletter you will find:

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The BIPP study has been awarded an extension

The BIPP study is very lucky to be funded by the Medical Research Council (MRC). The MRC is an organisation that funds research at the forefront of science to prevent illness, develop therapies, and improve human health.

Funding is extremely important for studies like BIPP to be able to happen. Without funding, we would not be able to hire the dedicated team of researchers we have or investigate important topics to support the development of children who were born very preterm.

Due to the COVID-19 pandemic, the progress of BIPP was delayed, which meant we lagged behind seeing as many participants as we initially set out to. This is because COVID-19-related restrictions prevented people from coming to visit us at St Thomas's Hospital. Therefore, we are happy to say that the MRC has granted us an extension to continue our study until Summer 2024.

This extra time will help us to test a sufficient number of children to increase our understanding of brain development and immune system activation in premature children as they grow up.

Medical Research Council

2024

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Recruitment Update

Our team has had a busy few years recruiting for the BIPP study. Children who have taken part have received a brain scan while watching their favourite Netflix show and played some games with our research staff. They also received a £40 gift voucher, a full brain report, and a developmental assessment report.

We are inviting preterm-born children who were previously part of the ePrime study back, and also recruiting a new group of children, aged 8-13 years, who were born at full-term, to act as a comparison group in our study.

So far, we have seen 262 participants; 194 of whom were born preterm and have previously taken part in the ePrime study (Principal investigator: Professor Edwards).

Thanks to our extension from the MRC, we now have plenty more time to continue with recruitment and to reach our overall study cohort goal of 360 participants. The more participants we see, the more new information we can gain to understand how the brain grows, and how the immune system functions following premature birth. This information could also help us to identify children who may benefit from psychological support as they grow.

Main Findings

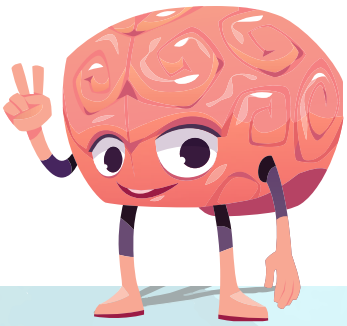
1. Practical steps can be taken to foster better development and well-being of very preterm children ï such as providing a cognitively stimulating home environment (full explanation of this is given on page 6).

2. During preschool age, children born very preterm often experience difficulties related to concentration, focus, and task completion.

3. Preterm born children with poorer mental health outcomes at pre-school age were more likely to have **mothers with higher anxiety** in the early postnatal period. The exact mechanisms that are causing the mental health difficulties in the child are not yet fully understood, but these findings could indicate that mental health traits are heritable.

4. Specific characteristics of preterm neonatesôbrains could predict their socio-emotional development in childhood. We found that childrenôs tendency to attribute negative emotions to daily events, which could lead to increased anxiety, was associated with two main neonatal brain features. These were: weaker structural connectivity in a white matter tract called the uncinate (ñhookò) fasciculus and altered functional communication within the limbic (ñborderò) system, both of which play a critical role in several aspects of social and emotional development.

5. Very preterm children with pre-existing internalizing problems (for instance, worry, loneliness, or low mood) may be more vulnerable to the negative impact of certain societal and familial stressors, such as social restrictions during the national COVID-19 lockdown periods. This suggests that children with a history of internalising problems may require more support during stressful situations.



Main Findings

6. We showed that some preterm toddlers who experience social communication problems have smaller neonatal brain volumes in the cerebellum (a region of the brain involved in some aspects of social and motor processing) compared to preterm children who do not experience such problems.

7. We have identified a well functioning or resilient group of very preterm children who experience no difficulties in cognition, attention, or social and emotional processing in childhood. This group had larger volumes of brain areas involved in emotional processing as neonates and received with more educational and stimulating experiences at home and in the family.

8. We looked at the association between difficulties in behaviour, temperament, and cognitive abilities and identified that most of the difficulties experienced by preterm children were linked to difficulties with organising and ordering their environment.

9. Infants born preterm considered to have “difficult” temperament (for example, being highly irritable or having difficulty soothing/interacting), remained difficult in early childhood, irrespective of maternal parenting style. However, infants considered to have “easy” temperament traits, were likely to have difficult temperament in childhood when maternal parenting style was more permissive and inconsistent.

Very Preterm Birth and the Home Environment

Preterm children are known to exhibit higher rates of inattention, anxiety, and social difficulties compared to children born at full-term. These behaviours can cause difficulties in day-to-day life and when severe they could even lead to clinical diagnoses such as attention-deficit hyperactivity disorder (ADHD) or autism-spectrum disorders (ASD). Alterations in brain development due to shorter time in the mother's womb could be partly responsible for the behavioral difficulties experienced by very preterm children. However, children's development is also heavily shaped by environmental factors; particularly by aspects of the immediate surrounding when growing up. The home environment and different parenting styles can also have an impact on a child's temperament and well-being.

We investigated the extent to which cognitive and psychological outcomes in preschool-aged children born very preterm are influenced by early brain development and the home environment. Specifically, we were interested in the impact of cognitively stimulating parenting on the development of these children.

Cognitively Stimulating Parenting

Cognitively stimulating parenting describes the extent to which a child is provided with educational and engaging experiences at home and in the family. This includes the availability of educational toys such as those that teach colours or shapes; fine-motor toys such as LEGO or colouring books; or musical instruments – as well as the extent to which parents engage in their child's learning, such as teaching them about numbers, shapes, or spatial relations. General exposure to books at home as well as frequency of family excursions or trips (e.g., to a museum) are also part of cognitively stimulating experiences.

In very preterm children aged 4 to 7 years, a relationship was found between cognitively stimulating parenting and behavioural outcomes that are particularly relevant to preterm birth. Preterm children who had experienced higher levels of cognitively stimulating parenting showed *lower* levels of inattention, fewer social difficulties, and better executive functioning (e.g., mental flexibility or attentional control).

Very Preterm Birth and the Home Environment

And the Brain?

We also looked at the structure of the brain in infancy in relation to childhood outcomes. Those infants whose brain volumes were larger in specific regions (such as areas of the frontal cortex) shortly after birth showed slightly better cognitive abilities later in childhood.

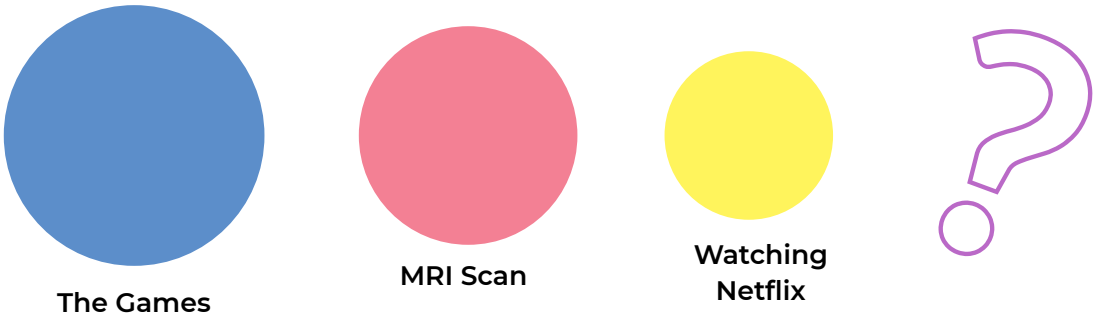
The study is a good example showing that **both nature and nurture play an important role in how children develop following preterm birth.** While some aspects of cognitive development in childhood were related to very early anatomical characteristics of the brain, the home environment is also likely to have an important effect on behavioural development; particularly when it comes to characteristics most affected by preterm birth (e.g. inattention and social difficulties).

The findings are encouraging as they suggests that children who were born very preterm and who might therefore be at a higher risk of certain developmental problems may benefit from being provided with a cognitively stimulating home environment in the preschool years. This means that practical steps can be taken by parents to foster the development and well-being of their very preterm children. Crucially, this is true even when effects of socio-economic status are accounted for (e.g., the level of the parents' education, or the level of deprivation in the neighbourhood) meaning that the beneficial effects are not a simple by-product of growing up in a more privileged surrounding.

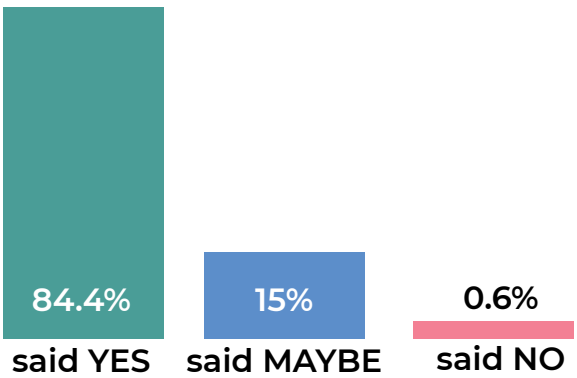
Feedback from children about their visits to our hospital

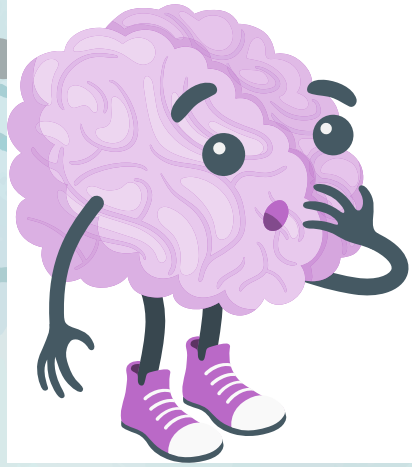
After every visit, we ask children to fill out a short feedback survey where we ask them questions such as what their favourite part of the day was. We put together a short summary of the results!

What were the children's top 3 favourite things about the day?

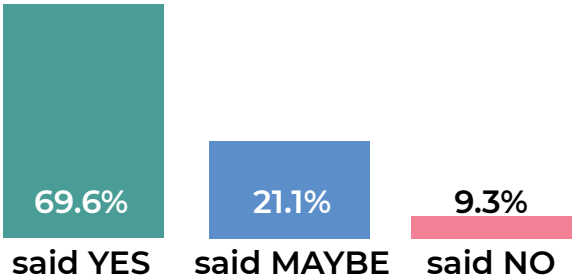


Would they visit again?

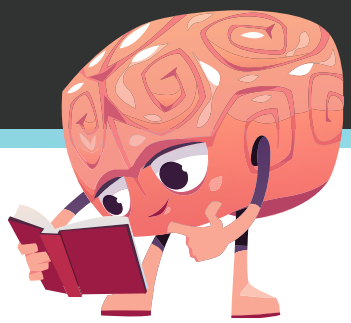




Would they have a brain scan again?



Parents' Feedback



"My daughter and I thoroughly enjoyed being part of the study. The whole process was extremely professional. On the day, the staff really went out of their way to make us feel welcome. They clearly explained what they were doing and were exceptional at putting my daughter at ease. A very positive experience all round."

"My daughter was really pleased to take part in the study because we all feel it's a great way to give back for the care we received when she was born early. The day itself was super well run, the researchers were kind and explained the process to my daughter - she was a bit worried she might be claustrophobic in the MRI machine but this was all explained to her and she watched videos and I got to watch her feet whilst she was in the machine on a screen which made us both feel better!"

Hello to our new Phd students and staff

Robin

Robin joined us as a PhD student and is studying how brain development impacts mental health in preterm children. Robin is helping out with the follow-up assessments so many of you yet will get a chance to meet him!

Check out Robin's Kings People Page by clicking here

Michaela

Michaela has 10+ years of experience in psychology and has worked in various mental health services. She is interested in infant development, parental reflective functioning, expressed emotion, attachment and mental health practice. She is currently completing a part-time PhD studying how different parenting styles influences child development using information collected in ePRIME and BIPP.

Abbie

Abbie has joined the team as a researcher after completing her Master's course in Clinical Mental Health Studies at University College London. She is interested in the prediction and prevention of mental health issues and is excited to have started on the team!

Check out Abbie's Kings People Page by clicking here

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Goodbye to our research assistants Marguerite and Laila

Marguerite

Marguerite has been a research assistant at the IoPPN for the past 2 years. Marguerite has now started an MRes in Experimental Neuroscience at Imperial College London. She has been an amazing asset to the BIPP study and will be sorely missed.

"Thank you to all the families who have come and visited us, I've enjoyed working with all of them and I am sad to say goodbye to BIPP."

Check out
Laila's Kings People
Page by clicking here

Laila

Laila has been a researcher and a PhD student at the Centre for the Developing Brain and the Institute of Psychiatry, Psychology and Neuroscience (IoPPN) at Kings College London for the past 4 years. She has been coordinating the BIPP study and investigating links between preterm children's brain development and mental health outcomes.

"I really enjoyed working on the BIPP study for the past few years. It has been a very stimulating and rewarding research project to work on, and meeting all the lovely participants and working with them and their families made this project all the more enjoyable."

Many of the children who have attended follow up visits will have met Marguerite and Laila.
We wish them every success for their next steps!

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Next steps

Thanks to our extension, we are going to continue recruitment for the next 6 months and try to reach our participant target by Summer 2024. Hopefully, over the next year we will have some more exciting studies published to share with you in the next few newsletters!

How to get involved

We always welcome parent's and participant's feedback, if you would like to write a piece for our next newsletter or the website feel free to contact us! We would love to hear from you.

You can view other opportunities to participate in research at the Institute of Psychiatry, Psychology and Neuroscience here.

Dear Reader,
Thank you for reading our Newsletter. We hope you enjoyed it and are looking forward to the next one. We want to thank you all for being involved in this study and contributing to our research. We hope you have a great Spring. If you'd like the get involved in this study, find out more or ask any questions, please do not hesitate to get in touch. You can find our contact details below.

Best wishes,
Prof Chiara Nosarti, Principal Investigator, and the BIPP Study Team

Check out our website for more BIPP content!

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@PretermResearch