The influence of preterm birth on language outcomes: The role of non-linguistic abilities, parental mental wellbeing, and parent-child relationships.

Sarah Coughlan, Jean Quigley, & Elizabeth Nixon

*Infant and Child Research Lab, Trinity College Dublin*
Presentation Overview

1. Background
   • Preterm birth in the Irish context
   • “High prevalence/Low severity” developmental difficulties

2. Research Objectives & Methodology
   • Aims and theoretical perspectives
   • Applied relevance
   • Analyses

3. Findings

4. Policy Implications

5. Future Research
BACKGROUND
Over 4,500 babies are born preterm in Ireland every year (HSE, 2018), making up 6-7% of all live births (EFCNI, 2012).

Medical advances →

- Lower prevalence of ‘high severity’ problems (e.g., cerebral palsy), but ...
- Persistence of ‘low severity’ problems (e.g., language difficulties, attention deficit hyperactivity disorder).

Medical advances ➔

• Lower prevalence of ‘high severity’ problems (e.g., cerebral palsy), but...

• Persistence of ‘low severity’ problems (e.g., language difficulties, attention deficit hyperactivity disorder).

In Ireland, the development of high-risk preterm infants is assessed at 2 years of age (with variations between hospitals in the definition of ‘high risk’ and the assessments used).
Difficulties with **expressive** and **receptive** language are found among preterm-children across **infancy, childhood, and adolescence** (Barre et al., 2011; Cattani et al., 2010; Luu et al., 2011; van Noort-van der Spek et al., 2011).
Difficulties with expressive and receptive language are found among preterm-children across infancy, childhood, and adolescence (Barre et al., 2011; Cattani et al., 2010; Luu et al., 2011; van Noort-van der Spek et al., 2011).

As language difficulties can have cascading effects on later school performance (Bleses et al., 2016), it is critical that we prevent the emergence of language difficulties and advance their early identification and treatment.
Large inter-individual variability in the language abilities of preterm-born children (Sansavini et al., 2011).

Identifying the risk/protective factors underlying this variability will assist in screening for high-risk children and in developing effective interventions.
Risk/Protective Factors

(see McNally & Quigley, 2014 for an analysis of GUI data)

Images from:
Image 2: https://nesca-newton.com/pcit-interview/
Image 3: https://www.parenta.com/2012/10/11/abacus-united-arab-emirates/
Risk/Protective Factors

Medical Characteristics

Parenting Context

Non-linguistic development

Images from:
Image 2: https://nesca-newton.com/pcit-interview/
Image 3: https://www.parenta.com/2012/10/11/abacus-united-arab-emirates/

(see McNally & Quigley, 2014 for an analysis of GUI data)
Risk/Protective Factors

(see McNally & Quigley, 2014 for an analysis of GUI data)

Images from:
Image 2: https://nesca-newton.com/pcit-interview/
Image 3: https://www.parenta.com/2012/10/11/abacus-united-arab-emirates/
Risk/Protective Factors

(see McNally & Quigley, 2014 for an analysis of GUI data)

Images from:
Image 2: https://nesca-newton.com/pcit-interview/
Image 3: https://www.parenta.com/2012/10/11/abacus-united-arab-emirates/
Language outcomes may be shaped by the **non-linguistic difficulties** of preterm-born children:
Language outcomes may be shaped by the **unique parenting context** associated with preterm birth:
Language outcomes may be shaped by the unique parenting context associated with preterm birth:
RESEARCH OBJECTIVE AND METHODOLOGY
To examine how preterm birth may shape expressive language outcomes via its influence on developmental risk/protective factors which encompass the parenting context and the child’s non-linguistic characteristics.

**Key theoretical perspectives:**

- Developmental cognitive linguistic perspective (Ibbotson, 2020).
- Transactional model of development (Fiese & Sameroff, 1989).
To advance our understanding of the factors that shape the language outcomes of preterm children in order to improve

a) **screening** and **prevention**

b) **intervention** and **service referral** procedures.
To advance our understanding of the factors that shape the language outcomes of preterm children in order to improve
a) screening and prevention
b) intervention and service referral procedures.

To apply this knowledge in the **Irish context** to
a) improve how routine developmental assessments of preterm children are carried out, and
b) achieve a more coordinated approach to the long-term care of preterm children.
**GUI cohort:** Infant cohort – Waves 1, 2, and 3

→ **Subset:** 8,712 families (538 preterm) that participated at all three waves.
**Method**

**GUI cohort:** Infant cohort – Waves 1, 2, and 3

→ **Subset:** 8,712 families (538 preterm) that participated at all three waves.

**Primary statistical model:** Longitudinal path models (with auto-regressive paths)
GUI cohort: Infant cohort – Waves 1, 2, and 3

→ Subset: 8,712 families (538 preterm) that participated at all three waves.

Primary statistical model: Longitudinal path models (with auto-regressive paths)

Statistical software: R

Data pre-processing:

• Weighting: WGT_5YRb survey weight
• Missing data treatment: multivariate imputation by chained equations.
Hypothesised Model

Notes:
Auto-regressive paths in grey. Covariates (income) and within-wave correlations not shown.
Notes:
Auto-regressive paths in grey. Covariates (income) and within-wave correlations not shown.
Hypothesised Model

Notes:
Auto-regressive paths in grey. Covariates (income) and within-wave correlations not shown.
Hypothesised Model

Notes:
Auto-regressive paths in grey. Covariates (income) and within-wave correlations not shown.
Hypothesised Model

Notes:
Auto-regressive paths in grey. Covariates (income) and within-wave correlations not shown.
Two structurally identical models: One with ‘parental’ variables (stress, depression, parent-child relationship) related to the mother, and the other with corresponding variables related to the father.
Two structurally identical models: One with ‘parental’ variables (stress, depression, parent-child relationship) related to the mother, and the other with corresponding variables related to the father.

Model fitting approach: Model generation approach (with iterative modifications).
Two structurally identical models: One with ‘parental’ variables (stress, depression, parent-child relationship) related to the mother, and the other with corresponding variables related to the father.

Model fitting approach: Model generation approach (with iterative modifications).

Model fit criteria (Hu & Bentler, 1999):

- Root mean square error of approximation (RMSEA): < .06
- Standardised root mean square residual (SRMR): < .08
- Comparative fit index (CFI): > .95
- Tucker-Lewis index (TLI): > .95

Critical threshold: \( p < .05 \)
FINDINGS
‘Mother’ model ($N = 8,712$)
‘Mother’ model \((N = 8,712)\)
‘Mother’ model \((N = 8,712)\)}
‘Father’ model \((N = 6,346)\)
‘Father’ model \((N = 6,346)\)

Significant mediation

Non-significant mediation
‘Father’ model \((N = 6,346)\)
No direct effect of gestational age on expressive language outcomes at 3 or 5 years of age.

The effect of gestational age on 3-year-old language outcomes is fully mediated by cognitive, motor, and social-personal abilities at 9 months of age. No mediation by mother-child/father-child relationship quality at 9 months.

**Mother-Father difference:** Parental stress (at 9 months) significantly mediates the association between gestational age and parent-child relationship quality (at 3 years) among fathers, but not among mothers.
POLICY IMPLICATIONS
Irish hospitals conduct developmental assessments of preterm infants at 2 years of age

- GUI data show that preterm-born children exhibit poorer expressive language abilities at 3 years of age.

- Since there is low stability in developmental scores across infancy/toddlerhood (Kalstabakken et al., 2021), difficulties not detected at 2 years of age may emerge later on.
Irish hospitals conduct developmental assessments of preterm infants at 2 years of age

- GUI data show that preterm-born children exhibit poorer expressive language abilities at 3 years of age.
- Since there is low stability in developmental scores across infancy/toddlerhood (Kalstabakken et al., 2021), difficulties not detected at 2 years of age may emerge later on.
- Potential need for repeated screening/assessment of preterm-born children during the preschool years (Kalstabakken et al., 2021).
Non-linguistic difficulties predict later language difficulties

• In the context of routine screening/assessments, non-linguistic developmental difficulties could signal the emergence of later language difficulties.
Non-linguistic difficulties predict later language difficulties

- In the context of routine screening/assessments, non-linguistic developmental difficulties could signal the emergence of later language difficulties.

- Any preventative or intervention measures targeted at improving language outcomes should embody a holistic view of the development of the preterm-born child.
Mothers and Fathers navigate the caregiving challenges associated with preterm-birth differently.

- In existing literature, fathers are often omitted or lumped alongside Mothers as ‘parents’.
- The current findings illustrate how separate processes characterise mothers’ and fathers’ experiences of caring for a preterm child, and the need for discrete research on each group.
Mothers and Fathers navigate the caregiving challenges associated with preterm-birth differently. 

- In existing literature, fathers are often omitted or lumped alongside Mothers as ‘parents’.
- The current findings illustrate how separate processes characterise mothers’ and fathers’ experiences of caring for a preterm child, and the need for discrete research on each group.

More efforts needed in Irish health policy to support fathers of preterm infants.

- Fathers treated as ‘secondary’ to mothers in their relevance as caregivers (Hennessy et al., 2020).
- Irish hospitals should proactively involve both parents in the care of preterm-born children through adopting ‘family-centred care’ (Baldoni et al., 2021) and through policy changes that facilitate the involvement of fathers (e.g., paternity leave extensions following preterm birth).
FUTURE RESEARCH
Building on these findings, the lab is investigating the parent-child relationships and developmental outcomes (incl. language) of preterm-born children in Ireland.

Fieldwork currently underway in collaboration with Coombe Women & Infants University Hospital and the wider community!

Also preparing a journal article aimed toward medical practitioners to provide guidance on the use of developmental assessment/screening tools with preterm-born children.
Thank you for your attention!

Acknowledgements
Dr Jean Quigley, Dr Elizabeth Nixon, Prof. Eleanor Molloy.

Team at Infant & Child Research Lab (TCD, School of Psychology).

Coombe Women and Infants University Hospital.

Families from the wider community and advocacy groups.

Contact Details
Sarah Coughlan
School of Psychology, Áras an Phiaraign, Trinity College Dublin, Dublin 2
coughlsa@tcd.ie

@SarahACoughlan

https://orcid.org/0000-0002-4805-6842


