



September 15th, 2021 08:30 - 10:30

PARALLEL SESSION 1- BRAIN 1

ID 283. NATURE AND NURTURE: NEONATAL AND SOCIAL RISK PROFILES IN EXTREMELY AND VERY PRETERM BORN CHILDREN AND THE IMPACT ON DEVELOPMENTAL OUTCOMES AT 5.5 YEARS

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BACKGROUND

To identify extremely preterm (EP; <28 weeks' gestation) and very preterm (VP; 28-31 weeks) born children with an increased risk for neurodevelopmental impairments, research has mostly focused on neonatal characteristics. However, developmental outcomes result from the interplay of biological and environmental factors. Despite this awareness, there has been little research interest in environmental factors to identify high-risk preterm infants. We aimed to address heterogeneity in the EP/VP population by describing environmental/social and neonatal risk profiles in a French population-based cohort and the relation with developmental outcomes at 5.5 years.

METHODS

The sample included 553 EP and 1497 VP children from the population-based EPIPAGE-2 cohort. Latent class analysis was used to distinguish risk groups based on 8 environmental factors (parental place of birth, language, neighborhood deprivation, urbanicity, single motherhood, profession, employment status, parental education level) and 6 neonatal factors (gestational age, small for gestational age, bronchopulmonary dysplasia, late-onset sepsis, brain lesions, necrotizing enterocolitis). Multivariable regression was used to test the relation between environmental and neonatal classes and intelligence (WPPSI-IV), motor skills (MABC-II), and behavior problems (SDQ).

RESULTS

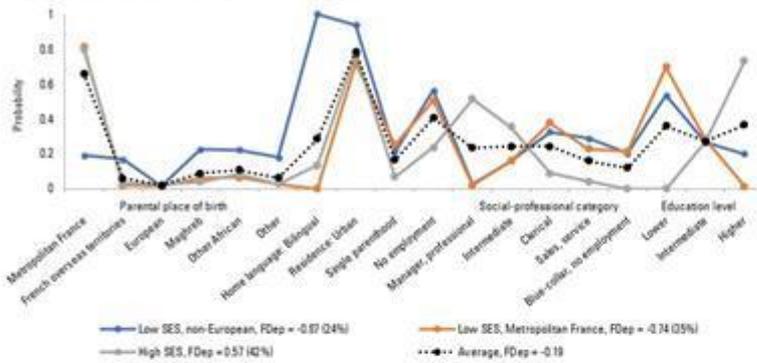
Three environmental/social classes were distinguished in both EP and VP samples (see Figure): low socioeconomic position with parent(s) born outside Europe, low socioeconomic position with both parents born in Metropolitan France, and high socioeconomic position. Based on neonatal characteristics, three classes were distinguished: high risk, moderate risk, and low risk, but probabilities for specific morbidities differed between EP and VP samples (see Figure). Environmental/social class had a large effect on IQ and small effects on motor skills, overall behavior, and externalizing problems in EP and VP children. Neonatal characteristics had small effects on motor skills, overall behavior, and externalizing problems in EP children and small effects on IQ and motor skills in VP children.

CONCLUSION

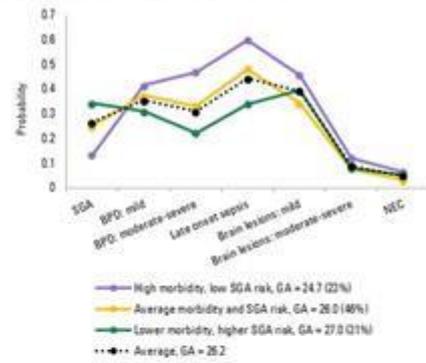
The EP/VP population is highly heterogeneous in terms of environmental/social and neonatal characteristics and outcomes. By identifying children with similar characteristics we gained more insight in which children are at risk for which difficulties. The findings emphasize that the role of the environment should not be underestimated in the identification of infants at risk for long-term impairments.



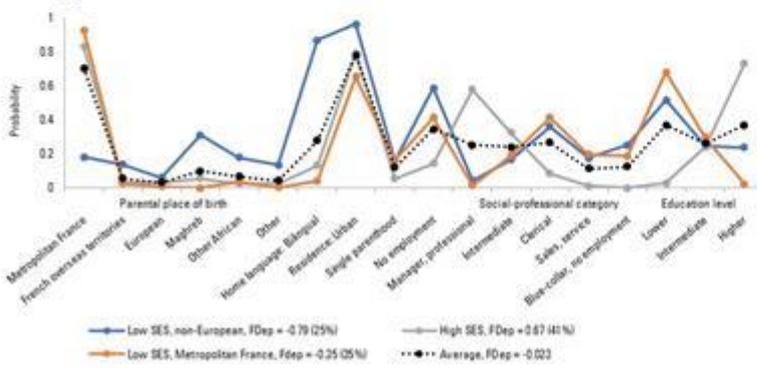
A: Extremely preterm - environmental factors



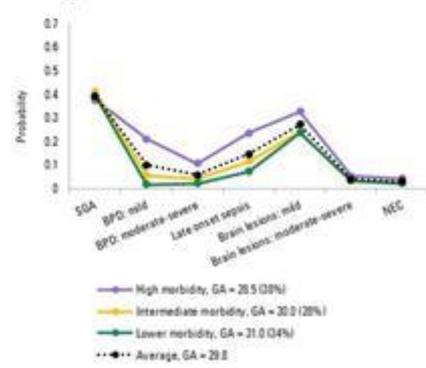
B: Extremely preterm - neonatal factors



C: Very preterm - environmental factors



D: Very preterm - neonatal factors



Profiles of environmental/social factors (A, C) and neonatal characteristics (B, D) in the extremely (A, B) and very preterm sample (C, D).

Profiles of environmental/social factors (A, C) and neonatal characteristics (B, D) in the extremely (A, B) and very preterm sample (C, D).

None declared



ID 0. Visual tracking performance in very preterm infants at 4 months predicts cognition and behavior at 6.5 years

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Background: Visual tracking of moving objects requires sustained attention and prediction of the object's trajectory. We hypothesized that visual tracking performance in infancy has long-term implications for neurodevelopment in very preterm infants.

Methods: Visual tracking was assessed at 4 month's corrected age in 57 infants with gestational ages 22-31 (mean 28.1) weeks. During the tracking assessment, an object moved back and forth in front of the infant with sinusoidal (predictable) or triangular (abrupt) turns of the direction, while eye and head movements were recorded. Gaze gain, smooth pursuit gain, and timing of gaze to object were analysed. At 6.5 years the children had visual examinations, cognition was assessed with the Wechsler Intelligence Scale for Children (WISC-IV) and attention by the Brown Attention Deficit Disorder (Brown ADD) scale. Univariate and multiple regression analyses were performed and included adjustments for neonatal risk factors: severe brain injury (IVH 3-4/PVL), retinopathy of prematurity stage 3 or more, bronchopulmonary dysplasia, and gestational age. A p-value <0.05 was considered significant.

Results: For both motion patterns, gaze gain was strongly related to all WISC-IV parameters and smooth pursuit gain to full-scale IQ and processing speed. For the sinusoidal pattern, smooth pursuit gain was also significantly related to working memory. Both motion patterns also related to several Brown-ADD parameters. For the sinusoidal motion pattern both timing of gaze to object and gaze gain related most strongly to "Focusing sustaining and shifting attention" ($R^2=0.17$, $p=0.004$; and $R^2=0.17$, $p=0.016$, respectively). For the triangular motion pattern, smooth pursuit gain associated to "Regulating alertness, sustaining effort and processing speed" ($R^2=0.16$, $p=0.006$). A visual acuity <0.8 at 6.5 years was associated with lower full-scale IQ but not to the visual tracking parameters.

Conclusion: The ability of very preterm infants to visually track and attend to a moving object at 4 month's corrected age is closely related to cognition and attention at 6.5 years.



ID 123. Association of Preterm Birth and Deprivation Together as Risk Factors for Learning Difficulties

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Background

1 in 10 children globally are born preterm¹ leading to a large proportion of morbidity and mortality in children representing a major target for intervention for benefit to public health. Preterm birth is associated with learning difficulties and impaired school performance in later life. Increasing risk of intellectual disability has been demonstrated with increasing social deprivation.

We sought to identify if children born preterm to families with higher levels of deprivation are disproportionately more likely to have a learning difficulty.

Methods

Data from the RANOPS (Respiratory And Neurological Outcomes in children born Preterm Study) a cross sectional survey of children in Wales was used to assess the prevalence of learning difficulties, behavioural problems and need for an educational statement by parental report by exposure. The effects of exposures of prematurity (gestation of less than 37 weeks) and deprivation (measured using the Welsh Index of Multiple Deprivation (WIMD)) were reviewed. Logistic regression models adapted for random effects of age at time of the survey were used to examine if gestational age and deprivation impacts interacted after adjustment for possible confounders.

Primary outcome measure was parentally reported learning difficulty. Secondary outcome measures were parentally reported behavioural problems and need for a statement of special educational need

Ethical approval was given for the original study by the South Wales Ethic Committee.

Results

6691 infants were investigated. Deprivation measured by decile (OR 1.08 (1.03-1.12), adjusted) and prematurity (OR 2.67 (2.02-3.53) adjusted) were both associated with occurrence of learning difficulty. The population attributable risk fraction (PAF) for learning difficulty following preterm birth was 4.89%. There was little evidence a model with interaction between prematurity and deprivation was superior to one without on likelihood ratio testing ($p=0.298$, adjusted)

Conclusion

Deprivation and preterm birth both have significant associations with learning difficulties. While deprivation does not appear to have potentiated the impact of preterm birth, preterm infants in the most deprived areas



have the highest risk of learning difficulties with almost 1 in 3 extremely premature born infants with a learning difficulty in the most deprived areas.

Neurodevelopmental Measure	Unadjusted model			Adjusted for demographics factors*			Adjusted for demographics* and clinical factors**		
	OR (95% CI)	p	Interaction	OR (95% CI)	p	Interaction	OR (95% CI)	p	Interaction
Learning Disability	N=6691			N=5443			N=4563		
Prematurity	2.52 (2.04-3.12)	<0.001	0.393	2.64 (2.07-3.37)	<0.001	0.517	2.67 (2.02-3.53)	<0.001	0.298
WIND decile	1.08 (1.04-1.11)	<0.001		1.07 (1.03-1.11)	0.001		1.08 (1.03-1.12)	0.001	
Educational Statement	N=3356			N=2594			N=2062		
Prematurity	2.99 (2.04-4.38)	<0.001	0.196	2.68 (1.75-4.11)	<0.001	0.578	2.44 (1.50-3.98)	<0.001	0.463
WIND decile	1.09 (1.03-1.15)	0.002		1.11 (1.05-1.19)	0.001		1.14 (1.06-1.23)	0.001	
Behavioural problems	N=6672			N=5429			N=4550		
Prematurity	2.01 (1.57-2.44)	<0.001	0.1425	2.14 (1.73-2.67)	<0.001	0.1417	2.07 (1.62-2.65)	<0.001	0.255
WIND decile	1.19 (1.15-1.22)	<0.001		1.14 (1.11-1.19)	<0.001		1.11 (1.07-1.16)	<0.001	

Logistic regression analysis of learning difficulties for preterm birth and increasing deprivation. (* Adjusted for maternal age, sex and ethnicity ** smoking, multiple birth, mode of delivery, birthweight and breastfeeding)

Logistic regression analysis of learning difficulties for preterm birth and increasing deprivation. (* Adjusted for maternal age, sex and ethnicity ** smoking, multiple birth, mode of delivery, birthweight and breastfeeding)

None declared



ID 267. NEURODEVELOPMENTAL OUTCOMES AT 2 YEARS AFTER EXTREMELY PRETERM BIRTH IN SWEDEN. A COMPARISON BETWEEN EXPRESS (2004-2007) AND EXPRESS2 (2014-2016) COHORTS

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BACKGROUND

Survival for extremely preterm infants has increased in Sweden and other countries. The latest study cohort (EXPRESS2, births in 2014-2016) showed significantly higher one-year survival without major neonatal morbidities among live births at 22-26 weeks than EXPRESS (births in 2004-2007)(1). We tested the hypothesis that neurodevelopmental outcome at 2 years of age improved between the study periods.

METHODS

All births at 22-26 weeks gestational age (n=2205) between April 1, 2004, and March 31, 2007 and between January 1, 2014, and December 31, 2016, in Sweden were studied (1). Follow up data from EXPRESS2 (2014-2016) collected according to the national guidelines at 2 years corrected age were obtained from the Swedish neonatal quality register. Out of 695 eligible survivors, neurosensory impairment (NSI; CP, visual and hearing impairment) was scored in 616 (89%) and neurodevelopmental impairment (NDI; CP, cognitive, language, motor, visual and hearing impairment) in 608 (87%) and compared with data from the EXPRESS 2004-2007 cohort where 456 out of 491 (93%) were assessed. Groups were compared with Chi-square test.

RESULTS

At 2 years in EXPRESS2, 35% had moderate-severe neurodevelopmental impairments, compared to 27% in EXPRESS and 12% in EXPRESS2 had moderate-severe neurosensory impairments compared to 7.5% in EXPRESS (see Table 1).

CONCLUSION

Improvements in neonatal survival and one year morbidity free survival were not paralleled by reduced rates of neurosensory or neurodevelopmental impairments at 2 years.

REFERENCES

- (1) Norman M et al, JAMA 2019, PMID: 30912837
- (2) Serenius F et al, JAMA 2013 PMID: 23632725



N(%)	NSI EXPRESS (2004-2007) N=456	NSI EXPRESS2 (2014-2016) N=616	NSI EXPRESS vs EXPRESS2	NDI EXPRESS (2004-2007) N=456	NDI EXPRESS2 (2014-2016) N=608	NDI EXPRESS vs EXPRESS2
No	409 (89.7)	486 (78.8)	P<0.001	192 (42.1)	275 (45.2)	P<0.001
Mild	13 (2.9)	54 (8.9)		140 (30.7)	121 (19.9)	
Moderate	25 (5.5)	44 (7.1)		74 (16.2)	107 (17.6)	
Severe	9 (2.0)	32 (5.2)		50 (11.0)	105 (17.2)	

None declared