



**QUEEN'S
UNIVERSITY
BELFAST**

The association between spastic Cerebral Palsy, intellectual impairment, and gestational age: results from the Northern Ireland Cerebral Palsy Register

Perra, O., Garcia Jalon, G., & Cummings, C. (2016). *The association between spastic Cerebral Palsy, intellectual impairment, and gestational age: results from the Northern Ireland Cerebral Palsy Register*. Poster session presented at European Academy of Childhood Disability International Conference on Cerebral Palsy and other Childhood-onset Disabilities, Stockholm, Sweden.

Queen's University Belfast - Research Portal:

[Link to publication record in Queen's University Belfast Research Portal](#)

Publisher rights

© 2016 The Authors

General rights

Copyright for the publications made accessible via the Queen's University Belfast Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The Research Portal is Queen's institutional repository that provides access to Queen's research output. Every effort has been made to ensure that content in the Research Portal does not infringe any person's rights, or applicable UK laws. If you discover content in the Research Portal that you believe breaches copyright or violates any law, please contact openaccess@qub.ac.uk.

Northern Ireland Cerebral Palsy Register (NICPR)

NICPR commenced its work in 1992 and it is one of the longest standing registers in Europe. The aims of the NICPR are to establish a systematic approach to the surveillance of Cerebral Palsy (CP) among children in Northern Ireland, and to support research and audits into the condition.

The Register has surveyed children with CP for a span of almost 40 birth years (1977-2016). Information on children with CP is collected by means of a Standard Assessment form completed by clinicians. The NICPR relies on the support of over 110 clinicians.

More details on the NICPR can be found on our website:

www.qub.ac.uk/research-centres/nicpr/

Email: nicpr@qub.ac.uk

Introduction

Evidence suggests there is a complex relationship between Cerebral Palsy subtype, gestational age (GA), and severity of intellectual impairment. To investigate these relationships, we conducted analyses on over 1,100 children with Spastic Bilateral and Unilateral Cerebral Palsy subtypes included in the NICPR, focusing on the intellectual impairment outcome.

Aims

- To assess the association between intellectual impairment severity and gestational age while controlling for birth weight
- To test if this association changes between the Spastic Bilateral and Unilateral Cerebral Palsy subtypes

Methods

Population: Children registered in NICPR born between 1981-2008 with Spastic Bilateral and Unilateral Cerebral Palsy subtypes. Those with acquired Cerebral Palsy (Cerebral Palsy due to lesions or anomalies occurring after 28 days of life) and those who died before the age of 2 were excluded.

Measures: **Gestational Age** was categorised into very/extremely preterm (<32 weeks), moderately preterm (32 to 36 weeks) and term (37+ weeks). **Birth weight** was standardised (z-scores) using Gardosi foetal growth standard curves (Gardosi et al., 1995).

Intellectual impairment was categorised into severe (IQ <50) and not severe (IQ ≥50). Surveillance of Cerebral Palsy in Europe categories for **Spastic Bilateral and Unilateral Cerebral Palsy subtypes** were used (SCPE, 2000). To control for **socio-economic deprivation**, we used the Northern Ireland Multiple Deprivation Measure (NISRA, 2005) and compared children living in areas in the most deprived quintile to children living in less deprived areas.

Statistical analyses

We used descriptive statistics and logistic regressions to investigate the effects of Gestational Age and Cerebral Palsy subtype on intellectual impairment, while controlling for standardised birth weight, child's sex, exposure to socio-economic deprivation, and the effects of year of birth.

Acknowledgments: We wish to thank the Public Health Agency, particularly Dr Brid Farrell, for supporting to the NICPR over the years.

Results

Descriptive statistics:

Information was available for 1,197 children born between 1981 and 2008 who were diagnosed with Bilateral (n = 693; 54% of all eligible) or Unilateral Spastic (n = 504; 39% of all eligible) Cerebral Palsy.

		Bilateral		Spastic		Unilateral		Spastic		Total	
		n	%	n	%	n	%	n	%		
Child's Sex	Female	261	37.7	236	46.8	497	41.5				
	Male	432	62.3	268	53.2	700	58.5				
Gestational Age	Very Pre-Term	238	34.3	102	20.2	340	28.4				
	Mod. Pre-Term	128	18.5	85	16.9	213	17.8				
	Term	327	47.2	317	62.9	644	53.8				
Deprivation	Less deprived	307	44.3	208	41.3	515	43.0				
	Most deprived	386	55.7	296	58.7	682	57.0				
Cognitive Impairment	Not severe	414	59.7	455	90.3	869	72.6				
	Severe	279	40.3	49	9.7	328	27.4				
		Mean	SD	Mean	SD	Mean	SD				
Birth Weight	Std Z score	-0.41	2.04	-0.31	1.63	-0.37	1.88				

Regression analyses:

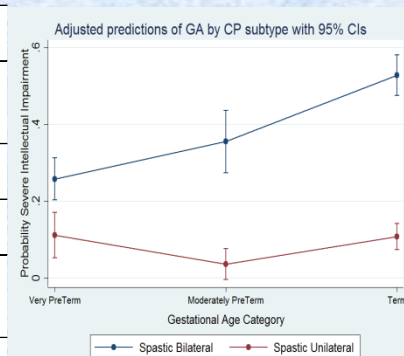
Premature birth was associated with reduced odds of severe intellectual impairment, but this effect was conditional on CP subtype.

A quadratic association was observed between standardised birth weight and severe intellectual impairment: probability of impairment increased steeply with lower standardised birth weight.

Results confirmed a strong association between Spastic Bilateral CP subtype and severe intellectual impairment. The probability of severe intellectual impairment among these children increased across gestational age categories (see Figure).

		OR	SE	z	95% CI
Gender	Female	reference	---	---	---
	Male	1.11	0.17	0.69	0.82 to 1.51
Gestational Age	Term	reference	---	---	---
	Mod. Pre-Term	0.29	0.18	-1.98*	0.09 to 0.99
Age	Very Pre-Term	1.01	0.37	0.03	0.49 to 2.07
	Birth Weight	Z score	0.92	0.04	-2.07*
Weight	Z score ²	1.01	0.01	2.10*	1.00 to 1.03
	CP Subtype	Spastic Unilateral	reference	---	---
Spastic Bilateral		10.12	2.27	10.32***	6.52 to 15.70
GA X CP Subtype	Term X Bilateral	reference	---	---	---
CP Subtype	MPT X Bilateral	1.54	1.02	0.65	0.42 to 5.67
	VPT X Bilateral	0.27	0.11	-3.12**	0.12 to 0.62
Multiple Deprivation	Less deprived	reference	---	---	---
	Most deprived	0.92	0.14	-0.55	0.69 to 1.24
Constant		0.08	0.03	-5.66***	0.03 to 0.19

*p < .05 **p < .01 ***p < .001



Discussion

The study provides further support to studies indicating that prematurity does not adversely affect the probability of intellectual impairment in children with Spastic Bilateral CP subtype (Hemmings et al, 2008).

These results may be explained by the fact that Spastic CP can be a heterogeneous group, with different aetiologies across gestational ages. However, these could also indicate that the brain may be able to compensate and reorganise following injuries during early development.

These findings need to be replicated and extended using larger datasets from international collaborations, and including more detailed information about birth.