INTERSECTION OF SOCIAL DISPARITY AND BRAIN INJURY IN CHILDREN WITH CONGENITAL HEART DISEASE: MODIFYING NEURODEVELOPMENTAL OUTCOMES

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INTRODUCTION

- Children with congenital heart disease (CHD) have **elevated risk for brain injury and neurodevelopmental impairments.**
- **Social disparity** modifies the relationship between brain injury and neurodevelopment in preterm children.

QUESTION

Does social disparity modify associations between brain injury and cognition in children with CHD?

METHODS

Retrospective cohort of 245 children with CHD who underwent neonatal cardiac surgery with pre- or post-operative brain MRI.

- Clinical and surgical variables which may be potential confounders
- **Moderate-severe brain injury** as defined as moderate-severe white matter injury (WMI), stroke, or grade 3-4 intraventricular hemorrhage (IVH)
- **Bayley-3 18-month cognitive outcomes**
- **Ontario Marginalization (ON-Marg) Index,** an area-based index to assess differences in various dimensions of marginalization in Ontario, was used to assess social disparity, specifically **material deprivation.**
- Children were separated into 3 groups: Group 1 representing the least deprived and 3, the most deprived.

Multivariable linear regression models were used to assess:

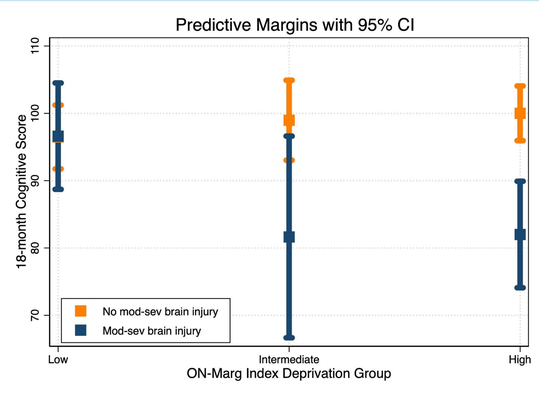
- Dependent variable: 18-month cognitive score
- Independent variable: Moderate-severe brain injury x material deprivation
- Covariates: Moderate-severe brain injury, material deprivation, heart lesion type, post-operative failure to thrive

RESULTS

There were **significant differences** in **heart lesion, completion of and age at balloon septostomy**, and **post-operative cardiac arrest** ($p<0.05$) among the groups.

			Group 1 (n = 87)	Group 2 (n = 52)	Group 3 (n = 106)	p
Clinical variables	Heart lesion, n (%)	TGA	51 (59)	34 (65)	43 (41)	0.005
		SVP	36 (41)	18 (35)	63 (59)	
	Male, n (%)		59 (67)	31 (59)	68 (64)	0.6
	Gestational age (weeks), mean (SD)		39 (2)	39 (2)	39 (1)	0.3
	Birth weight (g), mean (SD)		3230 (642)	3190 (446)	3208 (590)	0.7
	Birth head circumference (cm), mean (SD)		34 (2)	34 (1)	34 (1)	0.3
	APGAR at 5 minutes, mean (SD)		8 (1)	9 (1)	8 (1)	0.2
	Lowest pre-operative O2 saturation (%), mean (SD)		57 (23)	59 (24)	64 (19)	0.1
	Pre-operative hypotension, n (%)		18 (21)	9 (17)	14 (13)	0.4
	Pre-operative cardiac arrest, n (%)		3 (3)	3 (6)	4 (4)	0.8
Surgical variables	Balloon septostomy, n (%)		46 (53)	26 (50)	36 (34)	0.02
	DOL at balloon septostomy (days), mean (SD)		3 (6)	3 (4)	3 (5)	0.02
	DOL at operation (days), mean (SD)		41 (105)	21 (34)	39 (70)	0.9
	Bypass, n (%)		80 (93)	43 (84)	86 (84)	0.1
	Aortic cross-clamp, n (%)		79 (91)	43 (84)	84 (82)	0.1
	Circulation arrest time (mins), mean (SD)		6 (11)	4 (10)	9 (15)	0.1
Post-operative variables	Post-operative circulation arrest, n (%)		21 (24)	8 (16)	36 (35)	0.03
	ECLS, n (%)		12 (14)	5 (10)	19 (19)	0.4
	CRRT, n (%)		10 (14)	10 (23)	15 (16)	0.4
	Post-operative seizures, n (%)		3 (4)	0 (0)	8 (9)	0.09
	Failure to thrive, n (%)		15 (26)	6 (20)	17 (23)	0.8

Accounting for heart lesion and post-operative failure to thrive, **the relationship between brain injury and cognition was modified by material deprivation (p=0.01).**



Poorer outcomes were observed for infants with brain injury in the most deprived group only.

CONCLUSION

- Associations between **brain injury and cognition** are **modified by social differences** in children with CHD.
- Understanding impacts of social disparity in these relationships can reveal strategies to optimize neurodevelopment equitably.

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