

Peer Relationship Outcomes of School-Age Children Born Very Preterm

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Objectives To characterize the friendship networks, peer relationships, and bullying experiences of 12-year-old children born extremely preterm (EPT; 23-27 weeks of gestation), very preterm (VPT; 28-32 weeks of gestation), and full term (FT; 38-41 weeks of gestation), and to identify child characteristics placing children at risk of peer problems.

Study design A regional cohort of 44 EPT, 60 VPT, and 109 FT born children were followed prospectively to 12 years of age. The nature of children's close friendships, peer relations, and bullying experiences were assessed using a multimethod approach, including parent, teacher, and child report.

Results Across all measures, children born EPT had more peer social difficulties than children born VPT and FT. They were more likely to report no close friendships (5%-14% EPT vs 0%-3% VPT/FT), dissatisfaction with their peer network (16% vs 1%-2%), and less time interacting face-to-face with friends (16%-23% vs 5%-8%). They were also 3 times more likely to be rated by their parents and teachers as experiencing problems relating to peers ($P \leq .001$). In contrast, rates of chronic bullying (≥ 2 times/week) were similar for EPT and VPT children (12%-14% vs 4% FT). Emotional problems, inattention/hyperactivity, and motor deficits were associated with an increased risk of peer relationship problems, whereas higher body mass index, delayed pubertal development, vision problems, and inattention/hyperactivity problems were associated with frequent bullying.

Conclusions With the exception of bullying, risks of peer social difficulties were greatest among children born EPT. Peer social relationships should be monitored as part of longer term developmental surveillance and support. (*J Pediatr* 2018;■■:■■-■■).

Children born very preterm (VPT) are at high risk for a range of neurodevelopmental problems. These risks span cognitive, motor, and behavioral functioning, and increase with decreasing gestational age at birth.¹⁻³ However, little is known about their social development and in particular their relationships with peers. Making friends and being included in peer activities is important for a child's self-confidence and well-being. Peer interactions also provide a valuable context for children to learn about themselves and others, as well as to develop interpersonal skills critical for interacting with others in different settings.^{4,5} The quality of a child's peer relationships at school affects not only their concurrent academic achievement, but also their longer term mental health, employment, and intimate partner relationships.⁶⁻⁸

A recent review of 23 studies published between 1990 and 2014 found that VPT children are characterized by higher levels of social withdrawal and peer problems than children born at full term (FT), with those born extremely preterm (EPT) seeming to be at greatest risk.⁹ However, almost all of these early studies were based on parent report measures that typically consisted of a single item or brief subscale from a screening questionnaire. Using similar methods, recent data from the Bavarian and EPICure cohort studies also showed that VPT children were twice as likely as their term born peers to be bullied at school, with rates being higher at younger ages (6-8 years) than older ages (11-13 years).¹⁰ These studies highlight the possibility that VPT children may face significant social challenges as they navigate their school years.

However, there is a clear need for a more in-depth analysis of the quantity and quality of VPT children's social experiences with peers. Ideally, this research ought to involve not only an assessment of their interactions with their wider peer group, but also their capacity to form close friendships and the extent and nature of any peer victimization and bullying experiences. Information collected should capture the perspective of multiple informants who are able to observe the child across different settings. But, most importantly, it should include the child's own perspective. This perspective is likely to be especially relevant when assessing bullying, which can often be covert. To address these gaps, the first aim of this article was to describe VPT born children's friendships, peer relationships, and peer-bullying experiences relative to their FT peers during the middle school years. Given previous evidence to suggest that EPT children may be at an increased risk of social

EPT	Extremely preterm
FT	Full term
SDQ	Strengths and Difficulties Questionnaire
VPT	Very preterm

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difficulties, the VPT cohort was stratified into 2 groups: those born VPT (28-32 weeks of gestation) and those born EPT (23-27 weeks of gestation). We hypothesized that children born VPT and particularly those born EPT would have fewer friends, poorer quality friendships, more negative peer interactions, higher rates of peer problems, and be subject to higher rates of bullying than children born FT. Our second aim was to identify concurrent child characteristics that placed children at risk of social interaction difficulties with peers. We hypothesized that, after taking into account child sex and the extent of family social disadvantage, children subject to physical impairments and/or neurodevelopmental delays/impairments would be at greatest risk of peer difficulties and bullying.

Methods

The sample consisted of 3 groups. The first was a regional cohort of 110 children born VPT stratified into 2 groups: those born VPT (28-32 weeks of gestation) and those born EPT (23-27 weeks of gestation). These children were born between November 1998 and December 2000 and were consecutively admitted to the Level III Neonatal Intensive Care Unit at Christchurch Women's Hospital, New Zealand. This unit is the sole regional provider of neonatal intensive care services. In total, 92% of eligible infants were recruited. There were no differences in perinatal characteristics between recruited and nonrecruited infants. Excluding deaths ($n = 3$), sample retention to age 12 was 97% (VPT, $n = 60$; EPT, $n = 44$).

The comparison group consisted of a sample of 113 children born FT (38-41 weeks of gestation) recruited at 2 years of age. These children were identified from hospital birth records by alternately selecting for each preterm child, the second prior or subsequent same sex birth in the delivery schedule. Of those identified, 62% were recruited. Reasons for nonparticipation included untraced (47%), moved overseas (12.5%), refused (12.5%), and agreed but unable to attend the assessment within the 2-week window (28%). There were no differences between recruited and nonrecruited FT infants on measures of gestational age, birthweight, sex, family socioeconomic status, or ethnicity. This comparison sample was highly representative socioeconomically to the regional population from which it was recruited. Retention of the FT sample to age 12 was 96% ($n = 109$). A descriptive profile of the infant medical, family background, and concurrent functioning of study children is provided in [Table I](#).

Procedure

As part of a prospective cohort study, within 4 weeks of their corrected 12th birthday, children completed a comprehensive neurodevelopmental evaluation that included a multi-informant assessment of children's peer relationships and social interactions. Child report was obtained using a web-based questionnaire before the follow-up visit, or if necessary, through a confidential face-to-face interview at the time of the child's follow-up visit. Parents were interviewed separately from their child and each child's teacher was asked to complete a questionnaire about the child's academic performance and peer in-

Table I. Characteristics of the Study Sample

Measures	FT	VPT	EPT	P value
Neonatal medical factors				
Gestational age at birth (wk)	40 ± 1	29 ± 1	26 ± 1]	<.001
Birthweight (g)	3585 ± 411	1242 ± 226	803 ± 233	<.001
Male sex	59/109 (54)	32/60 (53)	20/44 (46)	.61
Twin birth	4/109 (4)	22/60 (37)	12/44 (27)	<.001
Small for gestational age	1/109 (1)	4/60 (7)	7/44 (16)	.001
Postnatal dexamethasone exposure	—	1/60 (2)	5/44 (11)	.08
Oxygen therapy at 36 wk	—	8/60 (13)	29/44 (66)	<.001
Culture proven sepsis	—	7/60 (12)	19/44 (43)	<.001
Intraventricular hemorrhage grade III/IV	—	1/60 (2)	5/44 (11)	.08
White matter abnormalities on term MRI				
None	—	18/60 (30)	5/43 (12)	
Mild	—	34/60 (57)	27/43 (63)	
Moderate to severe	—	8/60 (13)	11/43 (25)	.05
Family social background factors				
Maternal age (y)	31 ± 4	31 ± 5	31 ± 6	.85
Mother not a high school graduate	20/108 (19)	27/60 (45)	15/44 (34)	.001
Minority ethnicity	13/108 (12)	7/60 (12)	8/44 (18)	.55
Single parent family	13/108 (12)	10/60 (17)	10/44 (23)	.25
Family socioeconomic status				
Professional/managerial	38/108 (35)	15/60 (25)	11/44 (25)	
Technical/skilled	59/108 (55)	25/60 (42)	21/44 (48)	
Semiskilled/unskilled/unemployed	11/108 (10)	20/60 (33)	12/44 (27)	.005
Family social risk index	0.6 ± 0.8	1.0 ± 0.1	1.1 ± 1.1	<.001
Child functioning at age 12 y				
General cognition*	107 ± 14	99 ± 15	96 ± 15	<.001
Motor functioning†	11 ± 3	10 ± 3	7 ± 3	<.001

Values are shown as numerator/denominator (%) or mean ± SD.

*General cognition: Full Scale IQ score.

†Motor functioning: Movement ABC-2 Total Standard score.

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