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Very preterm birth influences parental mental health and family outcomes seven years after birth

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Abstract

Objectives—To evaluate the long-term influence of very preterm birth on parental mental health, family functioning and parenting stress at two and seven years.

Study design—Participants were 183 children born very preterm <30 weeks' gestation (*n* =148 families) and 69 term born children (*n* = 66 families). When children were seven years old, parents completed the Hospital Anxiety and Depression Scale, the Family Assessment Device, the Parenting Stress Index and the Social Support Questionnaire. Similar measures were collected at two years.

Results—When children were seven, parents of children that were very preterm were more likely to report moderate-severe anxiety symptoms (p=.03), higher levels of depression symptoms (p =.03), poorer family functioning (p<.05), and higher levels of parenting stress (p<.001) compared with parents of children born at term. Group differences in parenting stress and family functioning persisted after adjustment for social risk and child neurodevelopmental disability. There was strong evidence of a relationship between family functioning and parent-related stress at ages two and seven years (p<.001), but little evidence that parental mental health problems at two years were predictive of anxiety (p = .15) or depression (p = .28) at seven years for parents of very preterm children.

Conclusions—These findings demonstrate that very preterm birth has a negative influence on parent and family functioning seven years after birth, which for some families was consistent with their functioning at two years. These results have implications for the support needed by parents of very preterm children.

Keywords

prematurity; depression; anxiety; family functioning; parent stress

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Very preterm birth consistently increases the risk for impairments in neurosensory, physical, social-emotional and academic functioning in very preterm children.[1, 2, 3, 4] Research on the ongoing influence of very preterm birth on parents and the family is mixed, and comparisons between studies are difficult due to differences in selection criteria and era of birth. Parenting, and more generally the family environment, have a strong influence on child development,[5] and parental mental health problems are linked with poorer outcomes for children,[6] including those born preterm.[7,8,9]

Higher levels of parental distress, stress, depression and anxiety, greater family burden, and poorer family functioning in parents of very preterm or very low birth weight (VLBW; <1500 g) children are reported compared with parents of term born/normal birth weight (≥2500 g) children in infancy and early childhood,[9,10,11,12,13,14,15,16] although not all studies have found evidence for group differences across all areas of family outcome.[16, 17] Few have examined parent and family outcomes after early childhood. Two studies of parental mental health in families with VLBW or extremely low birthweight (ELBW, birthweight <1000 g) children have reported little evidence of group differences in psychological distress at school age or early adulthood,[18,19] although one of these studies found that having a child who had experienced bronchopulmonary dysplasia (BPD) had a negative impact on the family.[19] Mothers of ELBW adolescents report that their child's health influenced their own emotional health and marriage (both negatively and positively), and was a major factor in marriage breakdown.[20] In contrast, other studies found little evidence that preterm or ELBW/VLBW birth influenced parenting stress or family functioning during adolescence [21,22] or family functioning in early adulthood.[18]

Overall having a very preterm or ELBW/VLBW child appears to influence parental mental health, stress, and family functioning during early childhood. Although the strength of the relationship diminishes after this time, few studies have followed families after early childhood or include cohorts of very preterm children which contain many children born <28 weeks' gestational age who would not have survived in earlier eras. The aim of this study was to evaluate the longer term influence of very preterm birth on the family. We predicted that poorer parent and family outcomes for those with very preterm children would be seen seven years post-birth compared with families with term born children. Importantly, these outcomes were examined taking into account the influence of social, medical and developmental factors, given that these factors are likely to contribute to parent and family outcomes.[23, 24] A final aim of the study was to examine the relationship between two and seven year parent and family outcomes, where we expected to see continuity over time so that parents and families in distress at two years were more likely to be experiencing stress at seven years.

Methods

Participants were families from the Victorian Infant Brain Studies cohort, which included 224 infants born at <30 weeks' gestation or with a birth weight <1250 g at the Royal Women's Hospital, Melbourne Australia, between 2001 and 2003 (very preterm group). A comparison group of 77 full term children (>36 weeks' gestation) were recruited at birth from the Royal Women's Hospital maternity wards between 2001 and 2003 (n = 46) or at two years from maternal-child health centres in 2004 (n = 31), both in Melbourne, Australia. Outcomes at two and five years of age have been reported elsewhere.[9,16, 25] At seven years of age, corrected for prematurity, families were contacted and questionnaires concerning parent and family functioning were completed while children completed a neuropsychological and developmental assessment. This longitudinal study was approved by the Human Research Ethics Committees of the Royal Women's Hospital and the Royal

Children's Hospital, and informed written consent was obtained from parents for all children.

At two years the total score from the General Health Questionnaire (GHQ)[26] was used to assess parental mental health problems. The GHQ is a 28-item parent report measure assessing symptoms of mental health problems in 4 areas: cognitive symptoms of depression, anxiety symptoms, somatic symptoms and social dysfunction. The overall score was used as a marker of mental health problems due to the overlap in symptoms between the 4 areas that relate to different psychiatric diagnoses. Higher overall scores represent greater symptom severity (range for total score=0 to 84), and scores of 24 or greater used to indicate "clinically significant" symptoms of mental health problems.[27] At seven years, parental symptoms of anxiety and depression were measured using the Hospital Anxiety and Depression Scale (HADS[28]). The HADS has two sub-scales, anxiety (7 items), and depression (7 items). Items are scored on a four-point scale (0 = not at all, 3 = most) and summed to generate total scale scores. Scores were classified in the following categories: 0-7 = normal, 8-10 = mild, 11-15 = moderate, 16-21 = severe anxiety/depression. For the current study scores in the moderate to severe range (11-21) were classified as "clinically significant". There is evidence that the HADS performs well in assessing the severity of anxiety and depression in primary care patients and the general population.[29]

Social support was measured using the short version of the Social Support Questionnaire (SSQ6[30]). The SSQ assesses parental perceived availability of and satisfaction with their social support on six items, and has two scales: social support number (sum of number of people listed for each item divided by six, range = 0-9) and social support satisfaction (sum of satisfaction score for each item divided by six, range = 1-6). Higher scores represent a higher number of social supports and greater satisfaction with social support. The SSQ6 has acceptable test-retest and internal reliability.[30]

The Parenting Stress Index (PSI: long form[31]) provided a measure of stress associated with parenting and was completed by parents at seven years. Only the total parent-related stress index of this scale was completed at two years, and the total parent, total child and overall scales were calculated at seven years. The PSI provides scores for overall level of parenting stress, total parent-related stress (stress from personal distress, parent-child interaction and child's behavioral characteristics) and total child-related stress (stress related to child qualities that make it more difficult for parents to fulfil their parenting role). These scores are generated from 14 individual sub-scales (e.g., child adaptability, child mood, parent competence, parent isolation). Parents indicate the degree of agreement/disagreement to statements using a 5-point Likert scale. Higher scores indicate more stress, with score ranges of 131-320 for overall total stress, 69-188 for total parent-related stress and 50-145 for total child-related stress. The PSI has acceptable test-retest reliability and construct validity.[31]

Family functioning was assessed using the Family Assessment Device (FAD[32]) at both time points (two and seven years). The FAD has seven domains: problem solving, communication, roles, affective responsiveness, affective involvement, behavioral control, and general functioning. Parents completed this 60 item questionnaire by indicating their level of agreement or disagreement on a 4-point Likert scale for each item. The sum of scores divided by the number of items answered provides a score from 1 (lower scores representing healthy family functioning), to 4 (higher scores representing unhealthy family functioning) for each domain. The FAD has acceptable reliability and concurrent and discriminant validity.[32, 33]

At age seven years, additional data on family variables and neurodevelopment disability were also collected. Familial social risk was calculated from a composite measure assessing

six social risk factors (family structure, education of primary caregiver, occupation and employment status of primary income earner, language spoken at home and maternal age when the child was born) as used previously.[9,16] Each domain was scored on a three-point scale, where zero represented lowest risk and 2 represented highest risk, summed to give a total score 0-12.

Finally, neurodevelopmental disability was defined as having at least one child (in the case of twins and triplets) with a score <70 on the Full Scale Intelligence Quotient (FSIQ) on the Wechsler Abbreviated Scale of Intelligence,[34] severe cerebral palsy (i.e., not walking), blindness (visual acuity worse than 20/200 in the better eye) or significant hearing loss (requiring hearing aids or worse).[35]

Statistical Analyses

Data were analyzed using Stata 11.2.[36] First, chi-squared, Wilcoxon rank-sum tests and t-tests were used to compare social and medical characteristics of participating and non-participating families at seven years. To examine whether prematurity was associated with parent mental health, social support and family functioning, separate linear and logistic regression models were fitted to each continuous and categorical outcome respectively with an indicator for group. Because most of the outcome measures were assessed at the parent level, most analyses were carried out including families with twins/triplets only once per analysis (analysis carried out at the family level). Where logistic regression models could not be fitted (i.e., where there were no cases in one of the groups), chi-squared tests were used to compare families of very preterm and term children. The Parenting Stress Index (PSI) was the only outcome measure that was assessed per child, and group comparisons for this outcome were assessed including all children in the sample. To examine whether prematurity was associated with greater parenting stress, linear regression models using the PSI outcome variables were fitted at the child level using Generalised Estimating Equations (GEEs) with an exchangeable correlation structure and robust standard errors to allow for correlations between twins/triplets in the study.[37] The regression models for all outcomes were repeated adjusted for social risk and child neurodevelopmental disability to account for the potentially confounding effect of these variables on outcomes. Finally, linear and logistic regression models were used to examine whether parent and family outcomes at two years were predictive of parent and family outcomes at seven years across all children, adjusted for group and including an interaction between group and two year outcome. The pattern and strength of associations will be interpreted, rather than solely focusing of p-values to judge statistical significance.[38]

Results

Parent and family questionnaire data were missing for 49 children (22% of the original sample; 27 withdrew/declined, six were lost to follow-up and 16 did not complete at least one of the outcome measures at age seven years) resulting in 183 very preterm children (n =148 families) and 69 term children (n = 66 families) available for analysis in the current study. For very preterm children, there was little evidence of differences between families who completed family questionnaire data at seven years and those who did not, except completers on average had lower social risk score (2.3 vs. 3.6, p = .009) at age two years than non-completers (remainder of results not shown). There was little evidence of differences between families with term children who completed the family questionnaire at seven years and those who did not. The majority (90%) of primary caregivers who completed the questionnaires were mothers (fathers 9%; other relatives 1%). Within the study groups, the families of very preterm children reported higher social risk at seven years compared with children born at term (p<.01), and as expected the very preterm children had

lower birth weights ($p<.001$), gestational age at birth ($p<.001$) and fewer singletons ($p<.001$; Table I).

Parental mental health and social support at seven years

Parents with very preterm children reported slightly elevated anxiety symptoms at age seven years compared with parents of term children, although the group difference was not significant (Table II). However, when categorised according to severity of symptoms, the parents of very preterm children were more likely to report moderate-severe levels of anxiety than parents of term children. Depression scores were higher in parents of very preterm compared with parents of term children, but there were low numbers in both groups with moderate to severe depressive symptoms. After adjusting for social risk and child neurodevelopmental disability, the magnitude of the group differences diminished. The number of social supports and satisfaction with social support was similar between very preterm and term parents.

For parents of very preterm children, although the odds ratios (ORs) were close to two, there was little evidence that clinically significant mental health problems when their child was two years were predictive of moderate-severe anxiety (*OR* = 1.93, *95%CI* = 0.78, 4.76, $p = .15$) or moderate-severe depression when the child was seven years (*OR* = 2.35, *95%CI* = 0.50, 11.10, $p = .28$). Parents of term children with clinically significant mental health problems when their child was two years were more likely to report moderate-severe levels of anxiety when the child was seven years (*OR* = 11.33, *95% CI* = 1.34, 95.82, $p = .03$). No parents of term children reported moderate-severe levels of depression when the child was seven years thus this could not be analysed with relation to clinically significant mental health problems when the child was two.

Parenting Stress

Parents of very preterm children reported higher levels of total parenting stress, total parent-related stress and total child-related stress compared with parents of term children, conclusions that were unchanged after adjusting for social risk and child neurodevelopmental disability (Table III). After adjustment for social risk and child neurodevelopmental disability, there was evidence that parents of very preterm children reported higher stress related to their own health and a higher number of significant life events in the previous 12 months than parents of term children. Parents of very preterm children also reported higher levels of stress related to their child's distractibility, adaptability, demandingness and acceptability than parents of term born children. Higher total parent-related stress scores when the child was two years were predictive of higher total parent-related stress scores when the child was seven years (regression coefficient = 0.58, *95%CI* = 0.32, 0.83, $p < 0.001$), with little evidence that this relationship varied by group (interaction $p = .31$).

Family Functioning

Families with very preterm children reported poorer overall general family functioning (eg, higher scores) compared with families with term-born children (Table IV). Regarding the subdomains of family functioning, families with very preterm children also reported more difficulties solving problems within the family (problem solving), less clear and direct verbal messages (communication), less well established, clear and equitable roles (roles), more limited experiences of a range of emotional response to situations (affective responsiveness), and more involvement in each other's actions and lives (affective involvement). These relationships were similar (although the evidence was slightly weaker) after adjustment for social risk and child neurodevelopmental disability. Poorer general family functioning when the child was two years was predictive of poorer general family

functioning when the child was seven (regression coefficient = 0.40, *95%CI* = 0.27, 0.54, $p<.001$), with little evidence that this relationship varied by group (interaction $p = .13$).

It should be noted that for all outcomes (parental mental health, parenting stress, family functioning), analyses were conducted to examine whether child FSIQ (as opposed to child neurodevelopmental disability) mediated the relationship between group and outcomes. The results were very similar to the results adjusted for neurodevelopmental disability, suggesting that IQ, like disability, partially mediated the relationship between preterm birth and parental mental health (but not other outcomes). Overall, both social risk and child disability had some mediating effect on the differences between preterm and term groups, but of the two, social risk appeared to be more strongly related to outcomes than child disability.

Discussion

In our contemporary cohort of children born <30 weeks' gestation there was a substantial negative impact of very preterm birth on parents and families of seven year-old children. Parents of very preterm children reported higher levels of clinically significant anxiety, higher depression symptoms, higher levels of parenting stress and poorer family functioning compared with parents of children born at term. Many of these relationships persisted after adjusting for social risk and child neurodevelopmental disability (or child FSIQ), which can influence parent and family outcomes.

One of the unique aspects of the current study was the examination of parent anxiety and depression after very preterm birth in middle childhood. Although more parents in the very preterm group reported moderate-severe symptoms of anxiety and depression compared with the term group, average symptom scores on anxiety and depression for both groups were generally within the “normal” range. The only previous study examining parent mental health of eight year-olds found little evidence of VLBW on parental psychological distress.[19]

Importantly, after adjusting for social risk and child neurodevelopmental disability, the evidence for all group differences weakened, suggesting that the increased risk for depression and anxiety in parents of very preterm children is mediated by these factors to some degree. Nevertheless, the rates of clinically significant anxiety in the very preterm group were 2.5 times higher than in the term-born group, a difference we believe to be clinically important, indicating that many parents of very preterm children report levels of anxiety requiring treatment and support. Parents of very preterm children who reported significant mental health problems at two years were approximately twice as likely to report significant anxiety or depression at seven years, although these relationships did not reach statistical significance. Frequent assessment of parental mental health beginning in the hospital and continuing over the early years is important to help to understand changes over time. Assessment of parental mental health prior to preterm birth is also important (although challenging), as depression during pregnancy may increase the risk for preterm birth and low birth weight.[39]

In the current study, parents of very preterm children reported higher levels of overall total parenting stress, total parent-related stress and total child-related stress during middle childhood compared with parents of term born children, consistent with previous research examining early childhood or adolescent outcomes.[14,19,22] Evidence for these group differences remained after adjustment for social risk and child neurodevelopmental disability, consistent with previous research.[24] When the child was two years of age, there was little evidence for group differences in this same cohort on parenting stress.[16] This

suggests that parenting stress fluctuates over time, and might be higher for parents of very preterm children during middle childhood, a period that corresponds to the early years of schooling and potential discovery of learning or developmental challenges. Consistent with this, the strongest evidence of group differences in the current study was in the child-related stress sub domains (e.g., distractibility, adaptability), suggesting that the primary sources of parenting stress were characteristics of the child that make it more challenging to parent them. Parenting is influenced by characteristics of both the parent and child,[40] and the characteristics and developmental outcomes associated with prematurity are likely to influence parenting. Consistent with this, increased child-related parenting stress for parents of VLBW children was associated with increased behavioral difficulties and lower IQ in the VLBW children in one previous study.[14] Addressing cognitive, learning, behavioral and emotional challenges in very preterm children through early and targeted intervention may therefore also help to reduce parenting stress.

After adjustment for social risk and child neurodevelopmental disability, the current study found that families with very preterm children reported poorer overall general family functioning than families with term-born children. This suggests that the structural and organisational properties and relationships between family members for families with very preterm children are less healthy than for families with term-born children. Differences were also seen in all subdomains of the FAD except behavioural control, suggesting families with very preterm children experience greater challenges with solving problems, communicating with one another, establishing clear and equitable roles, expressing a wide range of emotions and not becoming overly involved with one another's actions and lives. Poorer family functioning and higher total parent-related stress at two years were predictive of similar difficulties at seven years for both groups in the study. This study of family functioning and parental stress in very preterm families suggests that early problems in family functioning and parent-related stress are likely to continue throughout childhood. This has important implications for the development of very preterm children, as the family and parenting environment are strongly associated with child development,[5] and further highlights the need for appropriate monitoring and support. Follow-up of the current cohort of families with very preterm children is important to observe whether family functioning improves over time in this more contemporary cohort.

Limitations of the current study include the relatively smaller group of families with term born children and 22% attrition rate for parent and family data at seven years, which may have reduced the power to find group differences. Despite this, however, we did find evidence of a number of important differences between the groups. Some relationships in the current study were influenced by child neurodevelopmental disability (or child IQ) and social risk (e.g. anxiety and depression), and others were influenced less (eg, parenting stress and family functioning). The complex and interacting factors that cause and maintain such outcomes (eg, child medical factors, social factors, child development) deserve further research because understanding these relationships will help to develop better ways to support parents following very preterm birth, and as a result also promote best outcomes for parents and their children. Further studies using methods such as structural equation modelling to examine these relationships in greater detail may be helpful. Finally, the results suggest that perhaps more effective support needs to be provided to families after very preterm birth in order to prevent parent and family difficulties from developing. Intervention for the child and family over the first year after very preterm birth can reduce symptoms of parental anxiety and depression at two years[41] and anxiety at four years,[42] promising results that indicate that effective support for parents is possible.

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Abbreviations

VLBW	very low birth weight
ELBW	extremely low birthweight
HADS	Hospital anxiety and depression scale
FAD	Family assessment device
PSI	Parenting stress index

Table 1

Characteristics of the study groups

	Very preterm (*n* = 183)	Term (*n* = 69)
Birth weight (g), *M* (*SD*)	969 (221)	3318 (510)
Birth weight SD score, *M* (*SD*)	-0.54 (0.95)	0.11 (0.90)
Gestational age (weeks), *M* (*SD*)	27.5 (1.93)	39.1 (1.30)
Female, *n* (%)	89 (47%)	35 (51%)
Singleton, *n* (%)	104(57%)	65 (94%)
Social risk at seven years, M (SD)	2.3 (1.8)	1.4 (1.4)
Oxygen at 36 weeks, *n* (%)	62 (34%)	-
IVH grade III/IV: *n* (%)	6 (3%)	-

Note. M = mean; *SD* = standard deviation; IVH=intraventricular haemorrhage on cranial ultrasound.

Table 2

Summary of parental mental health and social support outcomes at seven years' corrected age and comparison between very preterm (n = 147, missing data for one family) and term (n = 66) groups

	Very preterm	Term	Unadjusted		Adjusted for social risk		Adjusted for child neurodevelopmental disability		Adjusted for social risk and child disability	
	mean (SD)	mean (SD)	*β* (95%CI)	*p*	*β (95%CI)*	*p*	*β (95%CI)*	*p*	*β* (95%CI)	*p*
Anxiety score	7.01 (3.99)	6.00 (3.10)	1.01 (-0.09, 2.10)	.07	0.75 (-0.37, 1.86)	.19	0.93 (-0.18, 2.03)	.09	0.66 (-0.46, 1.79)	.25
Depression score	3.93 (3.64)	2.86 (2.67)	1.07 (0.08, 2.05)	.03	0.73 (-0.27, 1.73)	.15	1.13 (0.13, 2.12)	.03	0.79 (-0.22, 1.80)	.12
Social support number	4.55 (2.27)	4.51 (2.28)	0.04 (-0.62, 0.71)	.91	0.29 (-0.38, 0.95)	.40	0.04 (-0.63, 0.71)	.91	0.28 (-0.39, 0.96)	.41
Social support satisfaction	5.26 (1.04)	5.11 (1.25)	0.15 (-0.17, 0.47)	.37	0.16 (-0.18, 0.49)	.35	0.18 (-0.15, 0.51)	.28	0.19 (-0.15, 0.53)	.27
Clinically significant symptoms	***n* (%)**	***n* (%)**	***OR (95%CI)***	***p***					***OR (95%CI)***	***p***
Anxiety mod-severe	30 (20%)	5 (8%)	3.13 (1.16, 8.47)	.03	0.75 (-0.37, 1.86)	.19	0.93 (-0.18, 2.03)	.09	2.57 (0.92, 7.16)	.07
Depression mod-severe	7 (5%)	0	-	.07[1]					-	

Note.

[1] =*p* value from chi-squared test; CI = confidence interval; OR =odds ratio; SD = standard deviation.

Table 3

Parenting Stress at seven years' corrected age and comparison between parents of very preterm (n = 183) and term-born (n = 69) children

Measure	Mea n (SD)		Unadjusted		Adjusted for socia l risk		Adjusted for child neurodevelopmental disability		Adjusted for social risk and child disability	
	Very preterm	Term	*β (95%CI)*	*p*	*β (95%CI)*	*p*	*β (95%CI)*	*p*	*β (95%CI)*	*p*
Overall total parenting stress	212.8 (49.8)	189.9 (37.6)	24.4 (12.6, 36.2)	<0.001	20.03 (8.24, 31.82)	0.001	22.48 (10.54,34.43)	<0.001	18.2 (6.3, 30.1)	.003
Total parent-related stress	117.1 (28.1)	108.4 (24.6)	9.6 (2.4,16.8)	.009	7.50 (0.31, 14.69)	.04	9.36 (2.15, 16.58)	.01	7.3 (0.1, 14.5)	.048
Total child-related stress	96.2 (26.4)	81.6 (18.0)	15.8 (9.9, 21.7)	<0.001	12.85 (6.80, 18.90)	<0.001	14.47 (8.43, 20.51)	<0.001	11.6 (5.4, 17.7)	<0.001
Parent scales										
Competence	26.4 (7.5)	24.3 (6.0)	2.2 (0.4, 4.0)	.02	1.45 (-0.32, 3.21)	.11	2.18 (0.35, 4.02)	.02	1.5 (-0.3, 3.2)	.11
Isolation	12.3 (4.3)	11.7 (4.3)	0.9 (-0.2, 2.1)	.10	0.67 (-0.53, 1.86)	.28	0.94 (-0.22, 2.09)	.11	0.7 (-0.5,1.9)	.28
Attachment	11.1 (3.4)	10.6 (2.7)	0.6 (-0.2, 1.4)	.13	0.26 (-0.56, 1.08)	.53	0.51 (-0.32, 1.34)	.22	0.2 (-0.7, 1.0)	.69
Health	12.4 (3.8)	10.9 (3.4)	1.7 (0.7, 2.7)	.001	1.54 (0.54, 2.55)	.003	1.59 (0.59, 2.59)	.002	1.6 (0.5, 2.5)	.004
Role restriction	16.8 (5.4)	15.8 (5.5)	1.1 (-0.4, 2.6)	.14	0.88 (-0.63, 2.39)	.25	1.04 (-0.47, 2.56)	.18	0.8 (-0.7, 2.3)	.30
Spouse	17.5 (5.9)	15.8 (4.4)	1.4 (0.1, 2.7)	.03	1.31 (-0.01, 2.63)	.05	1.42 (0.13, 2.71)	.03	1.3 (-0.1, 2.6)	.06
Depression	21.0 (5.3)	19.3 (4.7)	1.8 (0.4, 3.2)	.01	1.34 (-0.08, 2.76)	.07	1.86 (0.45, 3.27)	.01	1.4 (-0.1, 2.9)	.05
Life events	8.9 (9.2)	6.3 (6.1)	2.8 (0.8, 4.8)	.006	2.07 (0.09, 4.04)	.04	2.94 (0.90, 4.98)	.005	2.2 (0.2, 4.2)	.04
Child scales										
Distractibility	22.9 (6.6)	19.6 (5.2)	3.7 (2.2, 5.3)	<0.001	3.00 (1.37, 4.63)	<0.001	3.57 (1.99, 5.16)	<0.001	2.8 (1.2, 4.5)	.001
Adaptability	24.3 (7.8)	19.9 (5.5)	4.9 (3.2, 6.7)	<0.001	3.99 (2.21, 5.77)	<0.001	4.53 (2.76, 6.30)	<0.001	3.6 (1.8, 5.4)	<0.001
Reinforces parent	9.0 (3.3)	8.3 (2.3)	0.8 (0.01,1.5)	.047	0.43 (-0.33, 1.20)	.27	0.79 (0.01, 1.57)	.05	0.5 (-0.3, 1.2)	.26
Demandingness	17.7 (6.2)	15.0 (4.4)	2.9 (1.5, 4.4)	<0.001	2.54 (1.08, 4.0)	.001	2.60 (1.14, 4.05)	<0.001	2.2 (0.7, 3.7)	.003
Mood	9.9 (3.4)	9.1 (2.4)	0.9 (0.1, 1.7)	.025	0.65 (-0.14, 1.44)	.11	0.83 (0.04, 1.61)	.04	0.6 (-0.2, 1.4)	.15
Acceptability	12.3 (4.6)	9.7 (2.8)	2.6 (1.6, 3.5)	<0.001	2.26 (1.23, 3.29)	<0.001	2.31 (1.31, 3.31)	<0.001	2.0 (0.9, 3.1)	<0.001

Note. CI = confidence interval

Table 4

Family functioning at seven years' corrected age and comparison between families of very preterm (n = 148) and term-born (n = 64, missing data for two families) children

Measure	Mean (SD)		Unadjusted		Adjusted for social risk		Adjusted for child neurodevelopmental disability		Adjusted for social risk and child disability	
	Very preterm	Term	*β (95%CI)*	*p*	*β (95%CI)*	*p*	*β (95%CI)*	*p*	*β (95%CI)*	*p*
General functioning	1.64 (0.47)	1.48 (0.34)	0.16 (0.03, 0.29)	.02	0.13 (-0.001, 0.26)	.05	0.16 (0.03, 0.29)	.01	0.14 (0.004, 0.27)	.04
Problem solving	1.86 (0.45)	1.68 (0.41)	0.17 (0.04, 0.30)	.01	0.15 (0.02, 0.29)	.02	0.17 (0.04, 0.31)	.009	0.15 (0.02, 0.29)	.03
Communication	1.89 (0.41)	1.70 (0.40)	0.19 (0.07, 0.31)	.002	0.16 (0.04, 0.28)	.01	0.18 (0.06, 0.30)	.004	0.15 (0.03, 0.27)	.02
Roles	2.12 (0.38)	1.96 (0.30)	0.16 (0.05, 0.26)	.004	0.12 (0.01, 0.23)	.03	0.17 (0.06, 0.28)	.002	0.13 (0.02, 0.24)	.02
Affective responsiveness	1.69 (0.50)	1.52 (0.39)	0.18 (0.04, 0.32)	.01	0.14 (-0.001, 0.28)	.05	0.18 (0.04, 0.32)	.01	0.15 (0.004, 0.29)	.04
Affective involvement	1.93 (0.44)	1.74 (0.37)	0.19 (0.07, 0.31)	.003	0.16 (0.03, 0.28)	.01	0.19 (0.06, 0.31)	.003	0.16 (0.03, 0.28)	.02
Behavioral control	1.59 (0.36)	1.49 (0.37)	0.10 (-0.01, 0.21)	.08	0.07 (-0.04, 0.18)	.23	0.10 (-0.007, 0.21)	.07	0.07 (-0.04, 0.18)	.21

Note. CI = confidence interval