



Relationship quality for mothers of very preterm infants



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ABSTRACT

There is a paucity of information on couple relationship quality in mothers of preterm infants during the first year of life. Aim: To determine couple relationship quality in mothers of very preterm infants in comparison to mothers of term infants and to examine maternal and infant factors associated with impaired couple relationship for the preterm mothers. Methods: At 4 and 12 months (corrected for prematurity for the preterm cohort), the mothers completed the Dyadic Adjustment Scale, the Edinburgh Postnatal Depression Scale, the Parenting Stress Index and the Short Temperament Scale. At 12 months, the infants had a neurodevelopmental assessment. Results: 86 mothers of preterm infants and 97 term mothers participated at 4 months, with 101 mothers of the preterm infants and 98 term mothers participating at 12 months. Comparisons of the two groups revealed no differences in Dyadic Adjustment or for any of the subscales. For the preterm mothers at 4 months, the independent variables associated with poor dyadic adjustment were ethnicity and higher levels of parenting stress. At 12 months, parenting stress was also an independent variable associated with impaired couple relationship. Conclusions: No differences in the incidence of poor quality couple relationship was found between mothers of very preterm and term infants. For preterm mothers, impaired couple relationship was associated with parenting stress.

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1. Introduction

The quality of the relationship between a mother and a father is of great significance for the outcome of a child, with marital satisfaction being associated with increased maternal sensitivity and attachment [1]. Stress in the relationship often relates to an accumulation of difficulties including lack of communication, difficulty in resolving conflicts and difficulty in accepting each other and may affect the quality of parenting [2]. Becoming a parent, especially for the first time, results in a major upheaval in family dynamics. This is likely to occur to a greater extent following the birth of an infant preterm. It is not uncommon when a baby is receiving care in a neonatal intensive care unit some distance from the parents' home, that the parents are separated for a large proportion of the baby's hospitalisation which may lead to further stresses in the relationship. In the immediate period after birth, it has been reported that mothers of preterm infants had negative perceptions of their infants if they had a difficult relationship with the father [3]. Conversely, it has been noted that mothers of both term and preterm babies who have positive relationships with their partners have greater general life satisfaction, more positive attitudes towards parenting and are more sensitive to infant cues [4]. Zelkowitz et al. [5] in a study undertaken two weeks after delivery of very preterm infants born

<1500 g birthweight found that marital quality in the mothers and fathers was similar to that expected for a term population, though higher levels of maternal anxiety affected the relationship between the parents.

There is scant information on couple relationship for parents of typically developing children. During early infancy, however, Elek et al. [6] found that marital satisfaction for both mothers and fathers of term infants decreased significantly from four to 12 months after the birth of their first child. Furthermore marital satisfaction was related to their satisfaction with parenting together with measures of infant care self-efficacy including infant feeding, health and safety. Ahlborg et al. [7], however reported that most first-time parents were happy in their relationship six months after delivery of their infant, though were discontented with their dyadic sexuality. Of interest and perhaps surprisingly, parents of infants with sleep problems did not appear to have problems with marital satisfaction, even though the children had slightly higher behaviour problems [8].

During infancy and later, the quality of the relationship between the mother and father has been demonstrated to be poorer for parents of children with developmental disabilities than for couples in the general population [2], though no analysis was performed according to the severity of the disability. It has been acknowledged, however that there is little information on relationship quality specifically for mothers of preterm infants beyond the neonatal period [9]. In the 1970s, Leifer et al. [10] indicated that the relationship of preterm mothers were more likely to end in divorce than for mothers of full term infants. The

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mothers of the preterm infants who divorced however were part of a group of mothers who were separated from their infants during hospitalisation for up to 12 weeks, having only visual contact during that time, which may have resulted in additional stresses in couple relationships. This situation is markedly different to current neonatal practices.

In more recent years, Harrison and Magill-Evans [11] found no significant differences in couple relationship for mothers and fathers of preterm (gestational age 30–36 weeks) and term infants. Carter et al. [14] examined parental responses in a neonatal intensive care unit (NICU). No differences between NICU and control groups were found in terms of the perceived quality of couple relationship, even when gestational age was taken into consideration. However, the EPIP AGE study that included infants of 26–32 weeks gestation and provided family centred care found higher levels of marital dissatisfaction for parents of preterm infants two months after hospital discharge [13].

Less marital satisfaction has been reported by Milgrom and McCloud [14] for mothers who had postnatal depression. However, there are little data on the association of impaired relationship quality and maternal or infant characteristics following the birth of a preterm infant, though Evans et al. [15] found a link between relationship satisfaction and maternal psychological symptoms.

Impaired couple relationship may be associated with parenting stress and may influence the temperament of a child. Importantly, however, poor marital quality at 12 months in a group of mothers of preterm infants predicted behaviour problems when the child was of preschool age [16].

As there is a paucity of information on marital quality and satisfaction in both mothers and fathers of preterm infants during the first year of life, it is important that this should be investigated further. The aim of the present study was to assess couple relationship quality in mothers of very preterm infants in comparison to mothers of term infants. Additionally the study aimed to examine the association of maternal factors including parenting stress and depression as well as infant temperament and development with impaired couple relationship for the preterm mothers.

2. Methods

2.1. Participants

The mothers in the present study were part of a prospective longitudinal observational study of parenting stress in mothers of both term and preterm infants [17,18]. The original sample consisted of 105 mothers who delivered 124 preterm infants born \leq 30 weeks gestation and 105 control mothers who delivered 120 infants at term at the Mater Mothers' Hospital, Brisbane. Mothers with twins where one twin died and mothers who were not English speaking were excluded from the study. The study received approval from the Mater Health Services Human Research Ethics Committee, Brisbane with written consent for participation given by all mothers.

2.2. Procedures

Sociodemographic data and neonatal variables were obtained following enrolment into the study for the preterm and term cohorts (Table 1). The principal difference between the two groups was that the term mothers had achieved a higher level of education. The Clinical Risk Index for Babies (CRIB) [19] score as a measure of the severity of neonatal morbidity was calculated for each baby, with the mean CRIB score being 2.89 (standard deviation, 3.05).

At 4 and 12 months of age (corrected for prematurity for the mothers of the preterm group) the mothers completed questionnaires on couple relationship quality, depression, parenting stress and the temperament of their infant. At 12 months of age, the infants were examined by paediatricians with the assessment including a neurological

Table 1

Maternal sociodemographic and infant variables for the preterm and term groups.

	Preterm n = 105	Term n = 105	p value
Maternal age—mean (SD)	29.7 (5.4)	30.5 (5.3)	0.28
Paternal age—mean (SD)	31.4 (6.2)	32.1 (5.10)	0.37
Multiple pregnancy, n (%)	19 (18)	15 (14)	0.57
Assisted reproduction, n (%)	17 (16)	9 (9)	0.14
Caesarean section, n (%)	60 (57)	52 (50)	0.33
Parity, 1st baby n (%)	63 (60)	52 (50)	0.33
Marital status, n (%)			
Married/defacto relationship n (%)	103 (98)	101 (96)	1.0
Ethnicity, White/Caucasian n (%)	89 (85)	98 (93)	0.07
Public insurance status, n (%)	56 (53)	55 (52)	1.0
Educational level n (%)			
Schooling complete	81 (77)	93 (88)	0.04
Tertiary qualification	31 (30)	61 (58)	0.0001
	N = 124	N = 120	
Male infant, n (%)	66 (53)	66 (53)	
Birth weight (g)—mean (SD)	1114 (342)	3331 (527)	
Weight < 1000 g, n (%)	52 (42)		
Gestation (weeks)—mean (SD)	27.7 (2.0)	38.8 (1.4)	
Born < 28 weeks, n (%)	50 (40)		

examination. Infants with cerebral palsy had a Gross Motor Functional Classification System (GMFCS) assessment [20]. Development was investigated using the Griffiths Mental Development Scales (GMDS) [21]. Information on hearing and vision was obtained from the mother. Neurodevelopmental disability was diagnosed on the basis of developmental delay (a score on the GMDS of > 1 standard deviation [SD] below the standardised mean [mean 100, SD 12]), blindness, hearing impairment requiring amplification or cerebral palsy [22].

2.3. Questionnaires

2.3.1. Dyadic adjustment scale (DAS) [23]

The DAS is a 32 item self-report measure of relationship quality that is simple to administer. It has been used extensively for married and cohabiting couples [5,11]. Raw scores that are derived from responses to the individual items in the questionnaire are converted to T-scores for analysis. The T-scores have a mean of 50 and a standard deviation of 10. Four sub-scales are reported: Dyadic Consensus (the extent of agreement between partners on matters such as money, household chores and time spent together), Dyadic Satisfaction (the degree of tension and stress in the relationship), Affectional Expression (satisfaction with the expression of affection in the relationship) and Dyadic Cohesion (common interests and activities shared by the couple). A total Dyadic Adjustment (DA) score is calculated by combining the scores of the four sub-scales. Higher scores suggest better adjustment with low scores indicative of general distress and dysfunction in the relationship. T-scores < 40 indicate significant problems [19]. The total score has an internal consistency reliability of 0.96 with the reliability for the sub-scales ranging from 0.73 to 0.94.

2.3.2. Edinburgh postnatal depression scale (EPDS) [24]

The 10-item EPDS is a well validated and widely used screening tool for depression after childbirth. Scores range from 0–30, with a score > 12 indicating probable depression. A sensitivity rate of 95% with a specificity of 93% has been previously demonstrated with this cut-off point.

2.3.3. Parenting stress index (PSI) short form [25]

The PSI Short Form consists of 36 items and produces a Total Stress score indicating the overall level of parenting stress that a person is experiencing. High scores are considered to be scores at or above the 85th percentile. The PSI also has three subscales: Parental Distress (PSI-PD) which measures distress that is experienced in the role of a

parent; Parent–child Dysfunctional Interaction (PSI-PCDI) reflects how a child meets the expectations of the parent together with the interactions with the child; Difficult Child (PSI-DC) focuses on the characteristics of the child that makes him/her easy or difficult to manage. The reported internal reliability coefficient for the Total Stress score is 0.91.

2.3.4. Short temperament scale for infants (STSI)/short temperament scale for toddlers (STST).

These scales were developed from the Australian Temperament Project [26]. Reports on behaviours observed are made on a scale from 'almost never' to 'almost always'. Dimensions of temperament are generated and by combining the Approach, Cooperation/Manageability and Irritability dimensions, an Easy/Difficult Scale score is calculated. The STSI was employed at four months and the STST at 12 months with both instruments having been reported to have good psychometric properties.

2.4. Statistical analysis

Descriptive characteristics (including maternal demographics, infant characteristics) comparing the very preterm and term groups are presented, with categorical data as number and percentage and continuous data as mean and SD, or median and interquartile range. Bivariate analysis was undertaken to compare the two groups for infant characteristics and questionnaire results utilising chi-squared tests, independent samples t-tests or Mann–Whitney rank-sum tests. The child temperament results and the results on the EPDS were analysed as continuous variables. In the situation of twins with differing results and/or clinical characteristics, the worse of the two twin scores/outcomes was used for analysis for the mother. To further elucidate the independent factors associated with the DAS Score for the preterm group, multivariate linear regression including maternal and infant characteristics was performed. The DAS scores were not normally distributed, and instead were squared before being used in the model, which subsequently satisfied all assumptions. Variables with a p value < 0.25 on bivariate analysis were entered into the model. Statistical analyses were deemed significant at the 0.05 level, with all analysis

performed in StataSE version 10.1 (StataCorp Ltd, College Station, Texas).

3. Results

Eighty six mothers of preterm infants and 97 term mothers participated in the study at four months, though four and one mother respectively chose not to complete the DAS. At 12 months, 101 mothers of the preterm infants and 98 mothers of term infants participated of whom 97 preterm mothers and 97 term mothers completed the DAS (Fig. 1). There were no significant differences in the sociodemographic characteristics of the preterm and term mothers apart from the fact that maternal education was greater for the term mothers (Table 1). There were no significant differences in the sociodemographic characteristics for the mothers who participated and those who chose not to complete and return questionnaires (data not shown).

At the 12 month paediatric assessment, six preterm infants were diagnosed with cerebral palsy (all GMFCS stage 1) and 19 had a GQ > 1 SD below the mean on the Griffiths scales. 17 children had a GQ $> 1-2$ SD below the mean, one child had a GQ $> 2-3$ SD below the mean, the remaining child had a GQ > 3 SD below the mean. No child had significant hearing impairment or was blind. Overall 24 infants were diagnosed with neurodevelopmental disability (22, mild; 1 moderate; 1 severe).

No child in the control group had cerebral palsy though one had congenital hearing impairment requiring hearing aids.

3.1. Comparisons of dyadic adjustment between preterm and term mothers

The comparison of the preterm and term groups did not reveal any differences in either the total mean DA or for any of the subscales (Table 2). Furthermore, there were no differences between the groups in terms of those who had significant problems (T-score > 40). At 12 months, however, 24% of the preterm mothers had problems with Affectional Expression compared to 15% of the term mothers. This was not statistically significant ($p = 0.115$). At the time of recruitment, two (2%) preterm mothers reported that they were single. By four

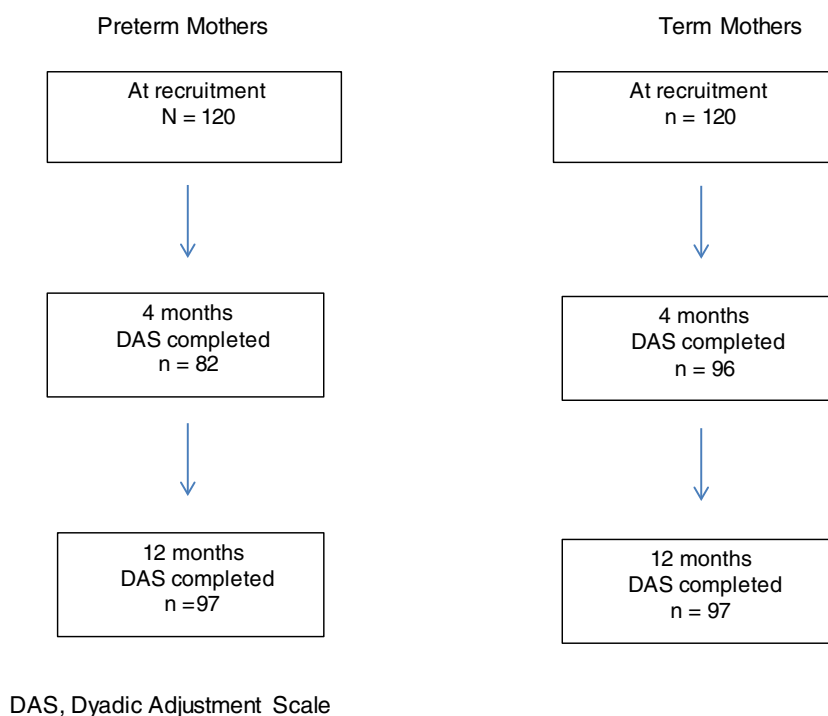


Fig. 1. Flow diagram for preterm and term participants at recruitment, 4 months and 12 months DAS, Dyadic Adjustment Scale.

Table 2
Total Dyadic Adjustment and Subscales for mothers of preterm and term infants at 4 and 12 months (T-scores).

4 months	Preterm	Term	p value
	n = 82	n = 96	
Dyadic Consensus—mean (SD)	48.2 (8.9)	47.5 (9.5)	0.63
Dyadic Satisfaction—mean (SD)	50.4 (7.7)	49.4 (9.3)	0.44
Affectionate Expression—mean (SD)	49.1 (11.0)	48.2 (9.7)	0.45
Dyadic Cohesion—mean (SD)	57.8 (9.9)	57.2 (9.3)	0.49
Dyadic Adjustment—mean (SD)	51.1 (9.9)	50.2 (10.1)	0.57
12 months	Preterm	Term	p value
	n = 97	n = 97	
Dyadic Consensus—mean (SD)	47.5 (8.2)	47.7 (8.9)	0.91
Dyadic Satisfaction—mean (SD)	48.9 (7.9)	48.3 (10.2)	0.64
Affectionate Expression—mean (SD)	46.9 (10.6)	47.6 (10.6)	0.66
Dyadic Cohesion—mean (SD)	56.8 (9.6)	56.4 (9.5)	0.78
Dyadic Adjustment—mean (SD)	49.6 (9.5)	49.4 (10.1)	0.89

months, five (6%) preterm mothers were reported to be single and by 12 months, eight (8%) mothers indicated that they were single. This compares to the mothers of the term infants, with four (4%) indicating that they were single at recruitment and six (6%) mothers reporting to be single at both four and 12 months. Thus even though more preterm mothers than term mothers were single at 12 months, this failed to reach statistical significance ($p = 0.055$). The comparison of the level of DA between the two time periods revealed no statistical difference. Similar results were obtained on analysis of the DAS subscales.

3.2. Risk factors for impaired couple relationship for the preterm mothers

Bivariate analysis was performed to establish associations between maternal and neonatal variables with total DA (T-score) for the mothers of the preterm infants at four and 12 months corrected for prematurity (Table 3). At four months Caucasian/White mothers were more likely to have impaired DA. Additionally mothers with high scores on the EPDS and on the total PSI had lower DA scores, as well as those mothers who considered their child to be more difficult on the temperament questionnaire. By 12 months, while there were no significant perinatal variables associated with low DA scores, the associations with depression, parenting stress and more difficult temperament persisted.

Analysis of the PSI subscales indicated that there was a significant association with lower DA scores with PSI-PD ($p < 0.001$) and PSI-PCDI ($p < 0.001$) at 4 months, while at 12 months there continued to

Table 3
Association (p value) of maternal and neonatal variables with Dyadic Adjustment—T score for mothers of preterm infants (corrected for prematurity).

	Bivariate analysis		Multivariate analysis	
	4 months n = 82	12 months n = 97	4 months n = 81	12 months n = 94
Maternal age	0.585	0.944		
Paternal age	0.249	0.687	0.181	
School complete	0.423	0.131		0.122
Tertiary complete	0.495	0.424		
Ethnicity	0.003	0.178	0.010	0.059
ART	0.485	0.612		
Multiple pregnancy	0.671	0.235		0.332
Gestation <28 weeks	0.926	0.232		0.192
CRIB score	0.642	0.579		
EPDS	0.009	0.001	0.204	0.295
PSI total	0.002	<0.001	0.116	<0.001
Temperament	<0.001	0.022	0.064	0.243
Neurodevelopmental Disability		0.442		

ART, artificial reproductive technology; CRIB, Clinical Risk Index for Babies; EPDS, Edinburgh postnatal depression score; PSI, Parenting Stress Index.

be a significant association with PSI-PD ($p < 0.001$) and PSI-PCDI ($p < 0.001$) with PSI-DC also showing statistical significance ($p = 0.035$).

Multivariate analysis revealed at four months the independent associations with poor DA were ethnicity and the maternal parenting stress subscales PSI-PD ($p = 0.034$) and PSI-PCDI ($p = 0.028$). At 12 months, the only variable that was independently associated with impaired couple relationship was higher levels of parenting stress on the PSI (Total PSI, $p < 0.001$; PSI-PCDI, $p = 0.014$). A sensitivity analysis was performed with maternal education included in the multivariate analysis which did not affect the significance of the results.

4. Discussion

The results of the present study indicated that there is no difference in the quality of the couple relationship between mothers of very preterm infants and mothers of term infants during the first year of life. This applied not only to the overall DA on the DAS, but also to the subscales. These results are quite similar to that found in other studies of mothers of more mature and relatively healthy preterm infants [11, 12]. Tommiska et al. [27] using the Swedish Parenthood Stress Questionnaire for parents of extremely low birthweight infants, at 2 years of age found that there were no more spousal relationship problems than was found in parents of term infants. In our study, more mothers of the preterm infants were single at 12 months compared to the term mothers, though this was not statistically significant. While information on divorce was not obtained, it is unlikely to be of significance, as in Australia there needs to be a period of separation for a married couple for at least 12 months before a divorce can be obtained. There are little published data on divorce/separation rates for parents of preterm infants [10], though Singer et al. [28] found that there were no significant difference in the divorce rates between families of very low birth weight children and families of term children. Thus, while it might be considered that the birth of a preterm infant would lead to great stresses in couple relationships, this does not appear to be the case.

Our neonatal nursery has a dedicated neonatal social worker who assesses the families of very preterm infants. Support is provided to the mothers regarding the grief and loss that they experience associated with the birth of their preterm infant. Additionally support is provided regarding the impact of having a preterm baby on the mother's relationship with the father of the baby. Many of the families are from regional centres with the fathers visiting their baby much less frequently due to work commitments. Accordingly there is a focus in making sure that the mothers keep their partners updated in their baby's progress and included in caring for the child when possible to ensure that marital satisfaction remains stable. This input may at least partially explain why the relationship quality for the preterm mothers is comparable to that found for the mothers of the term infants.

Little has been reported in the change in couple relationships during the year after the birth of a child. Elek et al. [6] indicated that marital satisfaction using the Dyadic Satisfaction subscale of the DAS significantly decreased for mothers of term infants from four to 12 months after the birth of their first child. The results in the present study are at variance to those findings as we demonstrated that while Dyadic Satisfaction did decrease in both the preterm and the term mothers, this was not statistically significant. Given that few mothers reported suboptimal marital satisfaction, the clinical importance of these findings is questionable, with further research being required.

There are little published data on the relationship of maternal and neonatal factors with couple relationship quality for mothers of preterm infants. Of note, despite the fact that the mothers of the term infants in the current study had reached a higher level of education than the mothers of the preterm infants, education level of the preterm mothers was not associated with couple relationship in the regression model. Zekowitz et al. [5] determined that maternal anxiety influences the relationship between the parents of very low birthweight infants, though the influence of depression per se was not examined. Evans et al. [15]

found that psychological symptoms including depression, anxiety and stress were independently associated with relationship impairment in mothers of preterm infants. While we found on bivariate analysis that depression was negatively associated with relationship quality in our preterm cohort as has been reported for mothers of term infants [14], this variable failed to reach statistical significance in the multivariate analysis.

The present study indicated that low scores in the DAS were associated with evidence of maternal parenting stress on the PSI–Short Form at both 4 and 12 months with statistical significance continuing on multivariate analysis at 12 months. As there was evidence that lower DA scores were associated with maternal depression, it is perhaps not surprising that low DA scores were associated with the PSI subscale PSI-PD which reflects distress due to personal issues such as life restrictions because of parenting demand and marital conflict. Additionally lower DA scores were also associated with impaired parent–child dysfunctional interaction on the PSI which focuses on the mother's view of expectations and interactions with the child. Perhaps if there are low maternal expectations with their child there would also be low expectations with regard to the couple relationship. The association of marital quality and parenting stress has been rarely previously examined. Harrison [11], in a study of parents of healthy preterm infants used the standard PSI and found that the DAS scores were significantly correlated with the PSI parent domain at both four and 12 months. This is not entirely surprising as the PSI includes some questions related to stress in marital relationships in a similar fashion to some questions on the DAS, but it may be possible to address aspects of parenting stress in mothers of preterm infants to improve their overall relationship quality.

Being White/Caucasian in ethnicity seemed to be associated with a poor quality of couple relationship compared to those preterm mothers that were non-White/Caucasian. There has been little published previously on the relationship of ethnicity to couple relationship satisfaction. Zerkowitz et al. [5] reported that the mean DAS scores were no different between native-born and foreign-born Canadian mothers of preterm in the first weeks after the birth of a very low birth weight infant. We did not have information regarding the country of birth of the mothers in the study. It may be however, that the non-White/Caucasian mothers in our study for cultural reasons had more support from relatives and friends which may have enhanced the relationship with their partner.

Temperament reflects individual differences in attentional, emotional and behavioural self-regulation, along with the relative level of emotional reactivity of a child. Using the temperament scales developed by the Australian Temperament Project, we found that the more difficult child was significantly associated with impaired DA adjustment, though it was not a significant independent variable at either four or 12 months. To our knowledge the relationship between relationship quality and temperament has not been previously examined. When, however, the association between marital quality and child behaviour problems was examined at age 4 years for parents of healthy preterm infants, the results on the DAS during the first year of life predicted the frequency of behaviour problems [16]. Further follow-up of the current cohort will be undertaken to determine if impaired dyadic adjustment in mothers of the very preterm infants during the first year of life is associated with later child behaviour problems.

Previously it has been indicated that mothers of infants with developmental disabilities have lower quality marital relationships [2]. So it was somewhat surprising that in the present study neurodevelopmental disability was not significantly associated with poor relationship quality in the mothers of the preterm infants. On closer examination of the group of infants with disability, however, the infants had only mild (GMFCS stage 1) cerebral palsy and none had significant hearing impairment or were blind. Additionally, for almost all of the infants with developmental problems, the impairment was mild [22]. Thus the mothers may not have perceived that their child had significant developmental problems and hence this did not contribute to any impairment in relationship quality or satisfaction. Treyvaud et al. [29]

in a study of mothers two years after very preterm birth found little evidence that having a child with a neurodevelopmental disability was associated with poorer family functioning. Overall this may suggest that the influence of disability with regard to families of preterm infants is less than reported for families of other infants with developmental concerns.

A strength of the study is that there were a relatively large number of participants and included term control mothers in addition to the mothers of the preterm infants. Additionally the retention rate was high, with 92% of the mothers who consented to the study during the neonatal period completing the questionnaires at 12 months following birth. A limitation of the study is that fathers were not included. In most families, it is the mother who is the primary caregiver and hence it is the mothers' mental health and relationship quality that are likely to influence the outcome of the child to the greatest degree. Furthermore many similar studies that have attempted to recruit fathers have found the participation rate to be disappointing [27,30].

In conclusion, the findings of our study indicated that there was no difference in the quality of couple relationship between mothers of very preterm and term infants. For the preterm mothers, impaired couple relationship was associated with depression and parenting stress, though it was only parenting stress that was a statistically significant independent variable. Welch et al. [31] with a family nurture intervention programme found that depression and anxiety in mothers of preterm infants was decreased. It is possible that the utilisation of a similar programme to reduce the risk of maternal depression, together with health care providers addressing the problem of maternal parenting stress may improve couple relationship for mothers of very preterm infants. Furthermore, in light of previous research that found an association between impaired marital quality in mothers of preterm infants and preschool behavioural problems [16], it may be that improvement in couple relationship will result in some long term benefits for the child.

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Conflict of interest

The authors have no conflict of interest to report in relation to this manuscript.

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