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Paternal postnatal depressive symptoms, infant sleeping and feeding behaviors, and rigid parental regulation : a correlational study.

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Abstract

Paternal postnatal depression (PND) is now recognized as a serious and prevalent problem, associated with poorer well-being and functioning of all family members. Aspects of infant temperament, sleeping and feeding perceived by parents as problematic are associated with maternal PND, however less is known about paternal PND. This study investigated depressive symptoms (Edinburgh Postnatal Depression Scale) in 219 fathers of infants aged from 1 to 24 weeks (median 7.0 weeks). Infant predictor variables were sleeping problems, feeding problems and both mother and father reported temperament. Control variables were partner support, other support and life events. Rigidity of parenting beliefs regarding infant regulation was also measured as a potential moderating factor. Infant feeding difficulties were associated with paternal depressive symptoms, subsuming the variance associated with both sleep problems and temperament. This relationship was not moderated by regulation beliefs. It was concluded that infant feeding is important to fathers. Fathers of infants with feeding difficulties may not be able to fulfill their idealized construction of involved fatherhood. Role incongruence may have an etiological role in paternal PND.

Paternal postnatal depression (PND) is increasingly recognized, by both researchers and practitioners, as an important psychological problem, with prevalence reported to approach that of maternal PND [1]. A meta-analysis of 43 studies conducted by US researchers estimated the rate of paternal depression to be 10.4% between the first trimester of pregnancy and one year postpartum. Between three and six months postpartum, the rate was estimated to be as high as 25.6% [2]. Paternal PND has serious impacts for father, mother and infant. For the father, PND in the first few days postpartum predicts continuing depressive symptoms two months later [3]. Paternal and maternal PND have been consistently reported to be strongly correlated [4,5], a finding that is not surprising given that depressive symptoms reduce capacity to support others, both instrumentally and emotionally [6,7]. Paternal PND has also been found to predict poor child emotional and psychological development as well as child psychopathology and behavioral problems, independently of maternal depression [8-12]. The accumulation of evidence regarding the high prevalence and substantial effects of paternal PND underlines the imperative to identify factors that might inform prevention and early intervention. The current paper examines relationships between infant behaviors, parenting belief systems and paternal PND in the early postnatal weeks.

The Social Context of Fathering

In Western societies there is now a widely held expectation that fathers of newborn infants will share household tasks and infant care [13-16]. The extent to which fathers actively participate in parenting, however, typically does not meet the emerging socially constructed image of “the new involved father” [17-21]. Nevertheless, many intact couples view equally shared parenting as the ideal [22], and fathers typically attempt to reconcile the new demands of parenting with the traditional role of breadwinner and protector [13,20,23]. Recent literature indicates that 21st century fathers often both want and expect to undertake involved parenting roles [4,24,25].

There is, however, little guidance available regarding how these tasks should be undertaken or how roles might be renegotiated in the perinatal and immediate postnatal period [15,16,26]. Fathers typically cannot look to their own fathers as role models, nor are there any clear culturally sanctioned rules or norms; rather, families must negotiate roles themselves [14,18,27]. Further, the image of father as protector and breadwinner still resonates strongly, precipitating a sense of dual conflicting roles and responsibilities [16,23]. Research indicates that first time fathers identify a need for support in the role of new parenthood [26,28]. Yet both informal social support systems and those provided within the formal health system remain primarily focused on the needs of mothers and infants. Health professionals often focus upon the mother as primary parent, with little guidance or preparation for fathers regarding the substantial and often unexpected changes that accompany the transition to parenthood and the addition of a newborn infant to the family system [15,16]. Infant behaviors that disrupt social and physical functioning or challenge expectations may further increase the need for support, and emphasize any feelings of exclusion or inadequacy [15,29].

Social Support

A systematic review by Wee et al. [4] identified the factors most commonly associated with paternal PND as partner depression, relationship quality and social support. Studies continue to corroborate these findings [30]. Recently, Don and Mickelson [5] provided empirical support for the proposition that the relationship between paternal and maternal PND could be attributed to reductions in spousal support and relationship satisfaction. Research also indicates that partner support may decrease immediately subsequent to childbirth. Claxton and Perry-Jenkins [31], for example, found that couples of young infants have less shared leisure time, and that this reduction was associated with

diminished feelings of love and increased conflict. More broadly, relationship proximity and satisfaction are reported to decrease over the transition to parenthood [32-36].

Paternal PND is also associated with reduced social support from family, kin, friends and health professionals [23,37,38]. Qualitative studies have found that whilst women often feel well supported in the peri- and postnatal period, men do not [28]. Health professions tend to privilege the mother's role as primary parent, and address the mother when couples present together [14-16,18,26,28]. The arrival of an infant can signal the end of bachelorhood with regard to previous leisure activities, thus reducing opportunities for social support from friends [24]. Time spent with work-based friendship groups may also be diminished. In a study by Davey, Dziurawiec, and O'Brien-Malone [13] men reported a desire to share experiences, strategies and information with other men. Men who participated in a group intervention that facilitated social support by other men reported reduced levels of depressive symptoms and stress. Another study [39] found that family social support reduced the negative effects of parenting stress on teenaged fathers of infants. It is likely that infant behaviors that are encountered as physically or emotionally demanding for the parent would contribute to parenting stress, and amplify the extent to which family life and support systems change for new fathers. Similarly, negative life events have consistently been reported to act as stressors and can decrease access to support in the transition to parenthood [1].

Accordingly, both negative life events and low social support have been found to be risk factors for PND in mothers and fathers [40].

Infant Behaviors and Parent Expectations

In early postnatal weeks infant behavior includes sleep-wake cycles that are of shorter duration than those in adults and high frequency of feeding. The extent to which infants self-regulate with regard to crying, feeding, settling and sleeping is subsumed by the broader construct of temperament. Depressive symptoms in fathers and mothers have been associated

with difficult infant temperament [41-43]. In mothers, infant sleep problems in particular are reliably associated with increased depressive symptoms [44-48]. Mechanisms by which aspects of infant temperament may lead to parent psychological distress are readily apparent as the infant's needs may be at odds with those of the parent. Reciprocal influence is also likely as depression adversely affects the quality of parent-infant interaction [49].

Parents vary considerably in the extent to which they believe that they can and should regulate or alternatively respond to infant behaviors. These alternative orientations have been termed facilitator and regulator. Facilitators attempt to adapt to the rhythms and self-regulatory patterns of the infant, whilst regulators attempt to promote adaptation of the infant to a prescribed routine and structure [50,51]. A facilitator orientation in mothers is associated with greater flexibility and responsiveness regarding sleeping patterns, active and frequent response to infant cues regarding settling, and closer proximity of parent and infant at night [52]. Research indicates that regulation beliefs do not strongly impact upon maternal subjective well-being [52] or psychological distress [53]. A recent study, however, reported that regulation beliefs moderate the association of infant sleeping problems and maternal depressive symptoms [53]. More frequent sleeping difficulties were associated with increased depressive symptoms, and this effect was more pronounced for mothers with a regulator orientation. For mothers, similar effects were not apparent for feeding difficulties beyond those accounted for by sleep difficulties. Few studies, however, have investigated relationships between sleeping and feeding difficulties and PND in fathers.

Paternal PND is also associated with unmet expectations regarding roles and family life subsequent to the birth of an infant [54,55]. Research examining contemporary fatherhood suggests that many fathers hold an ideal of father as involved co-parent [24]. In the early postnatal months, however, this ideal may be challenged as fathers find themselves taking on a secondary role. Infant feeding in general, and breastfeeding in particular, has been

identified as limiting father involvement to the extent that some feel shunned, isolated and inadequate [15]. As fathers can play an important role in promoting and supporting breastfeeding, with attendant psychological and health benefits for both mother and child, such feelings present particular cause for concern [56]. Changes in the couple's relationship as the roles are renegotiated to accommodate the addition of an infant to the family system are also often unexpected [55,57,58]. Such upheavals may engender feelings of helplessness, powerlessness or confusion for the father. Conversely a sense of control has been associated with lower levels of psychological distress in the parents of young infants [40].

In the present study, we investigated the relationship between paternal depressive symptoms and infant temperament, sleeping problems and feeding problems, whilst controlling for the known psychosocial correlates of PND: partner support, other support, and life events. We also investigated the extent to which these relationships may be moderated by regulation beliefs. We expected that infant behaviors would account for variance in depressive symptoms over and above that associated with other social contextual factors, however no hypotheses were specified regarding which forms of infant behavior would have effect as there is currently insufficient empirical evidence.

Method

Participants

Fathers (N=219) were recruited through mothers of infants aged 0 to 24 weeks (median 7 weeks) at general medical practices and child health clinics in Brisbane, Australia. Mean father age was 32.7 (SD = 5.3), 83.9% were married, 14.7% were not married but living with their partner, and 44.0% held a university degree or above. Regarding cultural background, 79.2% specified Australian and 8.8% specified English or Irish. For the remaining 12.0% a diversity of cultural identities were represented. Compared with the general Australian population in the reproductive age group (20-45) the fathers were more

highly educated and more likely to be in a registered marriage [59]. Approximately 70.2% of infants were exclusively breastfed and a further 18.2% were breast and bottle fed. Regarding infant gender, there were 109 boys and 109 girls with gender not specified in one case.

Measures

Measures were adapted from the Avon Longitudinal Study of Parents and Children (ALSPAC) [60], an ongoing longitudinal study of approximately 10 000 children and their parents. All measures are father-report except infant temperament, for which mother and father report are used. These measures have undergone extensive checking and review to ensure that items are ecologically appropriate and valid. Methods used to check validity have included review by expert panels and triangulation with other data [60]. Some of these measures exhibit low Cronbach's alpha values. In recent years, however, psychometricians have noted that Cronbach's alpha is sometimes not an appropriate measure of reliability [61,62]. Cronbach's alpha measures shared variance amongst scale items with the assumption that this shared variance is due to the influence of a latent construct, that is, some underlying fundamental factor. In the present study some scales were not constructed with the intention of representing latent constructs but rather take the approach of additive stressors, modeling on the optimality scoring often seen in obstetric literature [53,63,64,65]. This rationale applies to measures of sleeping problems, feeding problems, adverse life events and non-partner social support. Alpha values for other scales are presented below.

Temperament

Temperament was assessed using the adjective checklist method [66,67]. Both Mothers and Fathers were asked the extent to which the following descriptors applied to their infant: placid (reversed), grizzly, fretful, demanding, angry, and unsettled. Responses ranged from very like (0) to very unlike (3). In the present study Cronbach's α was .85 for mothers and .79. for fathers.

Infant Behavior

Fathers were asked about infant sleeping and feeding behaviors. Sleeping behaviors canvassed were: getting to sleep at night; getting to sleep in the day; staying asleep; and too little sleep. Response options were (0) often, (1) sometimes, and (2) never. Feeding behaviors canvassed were: drinking too fast or slow; spills, posits or vomits; always being hungry; taking only small amounts; refusing milk; and lots of wind. Responses were (0) never, (1) sometimes, (2) often, and (3) always.

Regulation beliefs

Regulation beliefs were measured with a 6 item scale: picking baby up immediately will spoil him/her; young babies should be in their parents' bed; cuddling a baby straight away when he/she cries makes him/her secure; it is important to develop a regular pattern of feeding and sleeping with baby; leaving a baby to cry when put to bed teaches him/her to settle; and babies should be picked up whenever they cry. Responses ranged from (0) strongly agree to (4) strongly disagree. Inspection of items indicates that high and low scores correspond to regulator and facilitator orientations as defined by Raphael-Leff [50,51] although items were not originally developed with reference to that framework. In the present study Cronbach's α was .75.

Partner Support

Eight partner support items were: I have no one to share my feelings with; my partner supports me emotionally; my partner supports me in practical ways; my partner does not encourage me in caring for the baby; parenthood has brought me and my partner closer together; my partner no longer gives me attention; when I finish work my partner expects me to take the baby; and, I will take the baby and let my partner get on with something for herself. Responses ranged from (0) never feel this way to (3) always feel this way. In the present study Cronbach's α was .70.

Other Support

Social support from others: 4 items canvassed the extent to which fathers received support from their doctor, other parents, their child health clinic, and family and friends. Response options ranged from (0) never feel this way to (4) always feel this way. A response option of “not applicable” was also available and was scored 0 as it indicated that the context in question was not a source of support.

Life events

Negative life events were assessed through an inventory of events over the previous 12 months: someone you knew died; partner, child, family or friend was seriously ill; you were ill; you or your partner had problems with work; you and your partner argued; you and your partner separated; you moved house; you had financial problems; and your baby was ill. The five response options ranged from (0) did not happen, to (4) affected me a lot.

Infant feeding method

Feeding method was assessed with the item “how has baby been fed since birth?” Response options were (1) breast only, (2) bottle only, (3) breast and bottle, (4) other.

Father education

Father education was assessed on a 7 point scale, ranging from (1) primary school to (7) University degree or above, with intermediate options as appropriate for the Australian educational context.

Depressive symptoms

Depressive symptoms were assessed with the Edinburgh Postnatal Depression Scale (EPDS) [68]. This 10 item measure has a response scale from 0 to 3 resulting in a score between 0 and 30. In the present study Cronbach’s α was .76.

Procedure

Ethical approval was granted by a university human research ethics committee. Cross-sectional data were gathered using surveys distributed to mothers or couples attending postnatal clinics at hospitals and community based clinics. Surveys were returned through reply-paid postage and did not require parent identity, although parents were given the option to identify themselves to be included in a prize draw.

Statistical Analyses

Focal analyses employed least squares multiple regression predicting paternal depressive symptoms. A histogram of residuals for the final regression model closely conformed to normality. Scatterplots confirmed that error variances approximated homoscedasticity. Pearson product-moment correlations were reported to allow direct comparison of zero-order correlations with semi-partial correlations derived from the regression analyses. A significance level of .05 two-tailed was employed.

Results

As almost all infants were either exclusively breast fed or mixed fed; this variable was dichotomised (exclusively breast fed, other). These groups did not differ with regard to levels of paternal depressive symptoms $t(217) = 1.56, p = .120, d = 0.023$, hence analyses were conducted with the sample as one group. Descriptive statistics and correlations between all measures are presented in Table 1. A series of hierarchical multiple regressions were performed to determine relationships of regulation beliefs, infant temperament (both mother and father report), sleeping behaviors, and feeding behaviors with depressive symptoms, yielding the results presented in Table 2.

(table 1 about here please)

Model 1 represents the baseline model which accounts for demographic factors and known psychosocial correlates of depressive symptoms. Predictors were infant age, infant sex, father age, father education, partner support, other support and life events. This model

was significant, $F(7,211) = 5.66, p < .001$, and accounted for 15.8% (adjusted $R^2 = .130$) of the variance in EPDS scores. Model 2 investigated the additional variance associated with mother reported infant temperament, father regulation beliefs, and the interaction between the two. The purpose of this model was to ascertain the impact of infant temperament with less influence of the possible confound of reporting bias associated with paternal PND. This model did not account for significant additional variance, adjusted $R^2 = .135, F_{\text{change}}(3, 208) = 1.44, p = .233$. Mother reported infant temperament was, therefore, not included in subsequent analyses.

Model 3 investigated the additional variance associated with father reported infant temperament, regulation beliefs, and the interaction between the two. This model accounted for an additional 4.5% of depressive symptom variance, adjusted $R^2 = .164, F_{\text{change}}(3, 208) = 3.89, p = .010$. As was the case for mother reported infant temperament, there was no significant interaction with regulation beliefs. Model 4 investigated the variance associated with father reported temperament, sleep behaviors and feeding behaviors, when combined as predictors in the same model. This model accounted for an additional 10.6% of depressive symptom variance above the baseline model, adjusted $R^2 = .214, F_{\text{change}}(7, 204) = 4.22, p < .001$. Feeding problems were not only a significant predictor but also accounted for almost all of the variance associated with sleeping behaviors and infant temperament; the beta weights for sleeping behaviors and father reported temperament became small and non-significant in the presence of feeding behaviors. Interactions between regulation beliefs and infant behaviors did not reach or approach significance.

(table 2 about here please)

Discussion

The present study sought to investigate relationships between infant behaviors (sleep, feeding, temperament) and paternal depressive symptoms whilst controlling for psychosocial

correlates. Consistent with previous research, partner social support and life events were significantly associated with depressive symptoms [5,23,40], although in regression models life events was the only significant predictor due to shared variance. The association of feeding behaviors with paternal depressive symptoms was considerably greater than that for sleeping behaviors or infant temperament. When entered into the same model the variance associated with sleeping behaviors and temperament was accounted for by feeding behaviors. These relationships with depressive symptoms were not moderated by regulation beliefs.

A key finding is that infant feeding problems have particular salience in paternal depressive symptoms. This finding contrasts with research on maternal PND which indicates that infant sleeping problems are most salient [44,45,53]. Several explanations for the importance of feeding problems to fathers are proposed. Feeding is particularly germane to paternal role incongruence. Fathers may find themselves in the position of being both the main source of support for the mother and the primary breadwinner, whilst concurrently feeling responsible for undertaking as much of the childcare load as possible during waking hours [23]. In the case of breastfeeding, however, if the infant is not feeding well, the father may be unable to provide direct instrumental support and feel helpless or excluded [69]. That is, there may be incongruence between the father's ability to participate and his perception of the ideal father role [70]. Incongruence between preconceived schemas and reality may be exacerbated by pre-existing parenting beliefs, such as the extent to which parents can and should regulate infant behavior. There is some evidence for this proposition regarding infant sleep problems and maternal PND [53]. Regulation beliefs, however, did not moderate associations between infant behaviors and paternal depressive symptoms in the present study. The findings suggest that regarding paternal PND, role efficacy and role strain may be of greater importance than parenting beliefs.

The findings of this study must be considered in the light its methodological approach. Firstly, as data are cross-sectional, no inferences regarding causal direction can be made. In early postpartum weeks, however, there is evidence that previously non-depressed mothers are more prone to PND if the newborn infant behaviors are encountered as demanding. Further, if parent expectation is modified depressive symptoms are likely to resolve [71,72]. Conversely, there is also research demonstrating that depressive symptoms in parents are associated with lower parenting effectiveness [73]. Second, while our study focuses on the dyadic relationship between infant behaviour and paternal depressive symptoms, the likelihood of multiple and reciprocal causal paths within family systems is acknowledged. While dyadic analyses contribute to the understanding of family dynamics [74], we acknowledge alternative methods that examine complex family systems [75]. Third, it is important to note that the rate of breastfeeding within the recruited sample was high. The data do not indicate if the effect size associated with feeding difficulties in the present sample would be maintained for exclusively bottle fed infants, where the father may be able to assume a primary role. Fourth, fathers were recruited through contact with their partners and, as a consequence, the sample was solely of intact couples among whom levels of relationship satisfaction and mutual support were likely higher than in the general population. Generalizability of the results is, in these ways, reduced. To understand the extent of the effect beyond intact and ostensibly harmonious couples would require recruitment of couples with manifest relationship disharmony, those living separately, or those in conditions of family stress. Finally, as most measures relied upon father report, the possibility of reporting bias associated with depressive symptoms cannot be discounted.

Conclusion

Our data indicate that within intact couples, infant feeding behavior is important for fathers' emotional functioning in the early postnatal months. We suggest a likely explanation

is that feeding problems can isolate the father and limit his ability to fulfill expectations of highly involved fatherhood. The relatively high prevalence of paternal postnatal depression in contemporary Western societies is consistent with this suggestion. When the infant is breastfed this effect may be particularly pronounced. Given the significance of breastfeeding maintenance to infant well-being, this is a significant flag for intervention. Health professionals should be alert to the need for support and assistance to both mothers and fathers as primary parents of young infants. For fathers, social-emotional support and identification of ways of involvement other than feeding should be made an explicit intervention target.

References

1. Paulson JF. Focusing on depression in expectant and new fathers: prenatal and postpartum depression not limited to mothers. *Psychiatric Times* 2010;27(2):48-52.
2. Paulson JF, Bazemore SD. Prenatal and postpartum depression in fathers and its association with maternal depression. *JAMA: the journal of the American Medical Association* 2010;303(19):1961-1969.
3. Séjourné N, Vaslot V, Beaumé M, Chabrol H. Intensité de la dépression postnatale dans un échantillon de pères français [Postpartum depression intensity in a sample of French fathers]. *Psychologie Française* 2012;57(3):215-222.
4. Wee KY, Skouteris H, Pier C, Richardson B, Milgrom J. Correlates of ante-and postnatal depression in fathers: A systematic review. *J. Affect. Disord.* 2011;130(3):358-377.
5. Don BP, Mickelson KD. Paternal postpartum depression: The role of maternal postpartum depression, spousal support, and relationship satisfaction. *Couple and Family Psychology: Research and Practice* 2012;1(4):323-334.
6. Lam RW, Filteau M-J, Milev R. Clinical effectiveness: the importance of psychosocial functioning outcomes. *J. Affect. Disord.* 2011;132:S9-S13.
7. Romera I, Perez V, Menchón JM, Delgado-Cohen H, Polavieja P, Gilaberte I. Social and occupational functioning impairment in patients in partial versus complete remission of a major depressive disorder episode. A six-month prospective epidemiological study. *Eur. Psychiatry* 2010;25(1):58-65.
8. Ramchandani PG, Stein A, Evans J, O'Connor TG, the ALSPAC study team. Paternal depression in the postnatal period and child development: a prospective population study. *The Lancet* 2005;365:2201-2205.
9. Ramchandani PG, Psychogiou L, Vlachos H, Iles J, Sethna V, Netsi E, Lodder A. Paternal depression: an examination of its links with father, child and family functioning in the postnatal period. *Depress. Anxiety* 2011;28(6):471-477.
10. Ramchandani PG, Stein A, O'Connor TG, Heron J, Murray L, Evans J. Depression in men in the postnatal period and later child psychopathology: a population cohort study. *J. Am. Acad. Child Adolesc. Psychiatry* 2008;47(4):390-398.
11. Paulson JF, Keefe HA, Leiferman JA. Early parental depression and child language development. *Journal of Child Psychology and Psychiatry* 2009;50(3):254-262.
12. Sethna V, Murray L, Ramchandani P. Depressed fathers' speech to their 3-month-old infants: a study of cognitive and mentalizing features in paternal speech. *Psychol. Med.* 2012;42(11):2361-2371.

13. Davey SJ, Dziurawiec S, O'Brien-Malone A. Men's voices: postnatal depression from the perspective of male partners. *Qual. Health Res.* 2006;16(2):206-220.
14. Fägerskiöld A. Support of fathers of infants by the child health nurse. *Scand. J. Caring Sci.* 2006;20(1):79-85.
15. Goodman JH. Becoming an involved father of an infant. *J. Obstet. Gynecol. Neonatal Nurs.* 2005;34(2):190-200.
16. Hinckley C, Ferreira R, Maree JG. The case of expectant fathers: Negotiating the changing role of males in a 'female' world. *Early Child Development and Care* 2007;177(5):461-478.
17. Cabrera NJ, Tamis-LeMonda CS, Bradley RH, Hofferth S, Lamb ME. Fatherhood in the twenty-first century. *Child Dev.* 2000;71(1):127-136.
18. Premberg Å, Hellström A-L, Berg M. Experiences of the first year as father. *Scand. J. Caring Sci.* 2008;22(1):56-63.
19. Matta DS, Knudson-Martin C. Father responsivity: Couple processes and the coconstruction of fatherhood. *Fam. Process* 2006;45(1):19-37.
20. McVeigh CA, Baafi M, Williamson M. Functional status after fatherhood: an Australian study. *J. Obstet. Gynecol. Neonatal Nurs.* 2002;31(2):165-171.
21. Wall G, Arnold S. How involved is involved fathering? An exploration of the contemporary culture of fatherhood. *Gender & Society* 2007;21(4):508-527.
22. Koivunen JM, Rothaupt JW, Wolfgram SM. Gender dynamics and role adjustment during the transition to parenthood: current perspectives. *The Family Journal* 2009;17(4):323-328.
23. Boyce P, Condon J, Barton J, Corkindale C. First-Time Fathers' Study: psychological distress in expectant fathers during pregnancy. *Australas. Psychiatry* 2007;41(9):718-725.
24. Fägerskiöld A. A change in life as experienced by first-time fathers. *Scand. J. Caring Sci.* 2008;22(1):64-71.
25. Maurer TW, Pleck JH. Fathers' caregiving and breadwinning: A gender congruence analysis. *Psychology of Men & Masculinity* 2006;7(2):101-112.
26. Deave T, Johnson D, Ingram J. Transition to parenthood: the needs of parents in pregnancy and early parenthood. *BMC Pregnancy and Childbirth* 2008;8(30).
27. Condon JT, Boyce P, Corkindale CJ. The First-Time Fathers Study: a prospective study of the mental health and wellbeing of men during the transition to parenthood. *Aust. N. Z. J. Psychiatry* 2004;38:56-64.

28. Deave T, Johnson D. The transition to parenthood: what does it mean for fathers? *J. Adv. Nurs.* 2008;63(6):626-633.
29. Goodman JH. Paternal postpartum depression, its relationship to maternal postpartum depression, and implications for family health. *J. Adv. Nurs.* 2004;45(1):26-35.
30. Mao Q, Zhu L-x, Su X-y. A comparison of postnatal depression and related factors between Chinese new mothers and fathers. *J. Clin. Nurs.* 2011;20:645-652.
31. Claxton A, Perry-Jenkins M. No fun anymore: Leisure and marital quality across the transition to parenthood. *Journal of Marriage and Family* 2008;70(1):28-43.
32. Keizer R, Dykstra PA, Poortman A-R. The transition to parenthood and well-being: the impact of partner status and work hour transitions. *J. Fam. Psychol.* 2010;24(4):429-438.
33. Mitnick DM, Heyman RE, Smith Slep AM. Changes in relationship satisfaction across the transition to parenthood: a meta-analysis. *J. Fam. Psychol.* 2009;23(6):848-852.
34. Figueiredo B, Field T, Diego M, Hernandez-Reif M, Deeds O, Ascencio A. Partner relationships during the transition to parenthood. *Journal of Reproductive and Infant Psychology* 2008;26(2):99-107.
35. Lawrence E, Nylen K, Cobb RJ. Prenatal expectations and marital satisfaction over the transition to parenthood. *J. Fam. Psychol.* 2007;21(2):155-164.
36. Schulz MS, Cowan CP, Cowan PA. Promoting healthy beginnings: a randomized controlled trial of a preventive intervention to preserve marital quality during the transition to parenthood. *J. Consult. Clin. Psychol.* 2006;74(1):20-31.
37. Deater-Deckard K, Pickering K, Dunn JF, Golding J, the Avon Longitudinal study of Pregnancy and Childhood Study team. Family structure and depressive symptoms in men preceding and following the birth of a child. *Am. J. Psychiatry* 1998;155(6):818-823.
38. Durkin S, Morse C, Buist A. The factor structure of prenatal psychological and psychosocial functioning in first-time expectant parents. *Journal of Reproductive and Infant Psychology* 2001;19(2):121-134.
39. Fagan J, Bernd E, Whiteman V. Adolescent fathers' parenting stress, social support, and involvement with infants. *Journal of Research on Adolescence* 2007;17(1):1-22.
40. Keeton CP, Perry-Jenkins M, Sayer AG. Sense of control predicts depressive and anxious symptoms across the transition to parenthood. *J. Fam. Psychol.* 2008;22(2):212-221.

41. Dudley M, Roy K, Kelk N, Bernard D. Psychological correlates of depression in fathers and mothers in the first postnatal year. *Journal of Reproductive and Infant Psychology* 2001;19(3):187-202.
42. Hanington L, Ramchandani P, Stein A. Parental depression and child temperament: assessing child to parent effects in a longitudinal population study. *Infant Behavior and Development* 2010;33(1):88-95.
43. Maxted AE, Dickstein S, Miller-Loncar C, High P, Spritz B, Liu J, Lester BM. Infant colic and maternal depression. *Infant Mental Health Journal* 2005;26(1):56-68.
44. Bayer JK, Hiscock H, Hampton A, Wake M. Sleep problems in young infants and maternal mental and physical health. *J. Paediatr. Child Health* 2007;43:66-73.
45. Hiscock H, Wake M. Infant sleep problems and postnatal depression: a community-based study. *Pediatrics* 2001;107(6):1317-1322.
46. Hiscock H, Wake M. Randomised controlled trial of behavioural infant sleep intervention to improve infant sleep and maternal mood. *BMJ* 2002;324(7345):1062-1065.
47. Martin J, Hiscock H, Hardy P, Davey B, Wake M. Adverse associations of infant and child sleep problems and parent health: an Australian population study. *Pediatrics* 2007;119(5):947-955.
48. Dennis C-L, Ross L. Relationships among infant sleep patterns, maternal fatigue, and development of depressive symptomatology. *Birth* 2005;32(3):187-193.
49. Goodman JH. Influences of maternal postpartum depression on fathers and on father–infant interaction. *Infant Ment Health J* 2008;29(6):624-643.
50. Raphael-Leff J. Facilitators and Regulators: Vulnerability to Postnatal Disturbance. *J Psychosom Obstet Gynaecol* 1985; 4(3):151-168.
51. Raphael-Leff J. Facilitators and Regulators; Participators and Renouncers: Mothers' and Fathers' Orientations towards Pregnancy and Parenthood. *J Psychosom Obstet Gynaecol* 1985;4(3):169-184.
52. Roncolato, W., & McMahon, C. Facilitators and regulators: infant sleep practices and maternal subjective well-being. *J Reprod Infant Psysc* 2013;31(2):134-147.
53. Muscat T, Obst PL, Cockshaw WD, Thorpe K. Beliefs about infant regulation, early infant behaviors and maternal postnatal depressive symptoms. *Birth* 2014;41(2):206-213.
54. Biehle SN, Mickelson KD. First-time parents' expectations about the division of childcare and play. *J. Fam. Psychol.* 2012;26(1):36-45.

55. Bielawska-Batorowicz E, Kossakowska-Petrycka K. Depressive mood in men after the birth of their offspring in relation to a partner's depression, social support, fathers' personality and prenatal expectations. *Journal of Reproductive and Infant Psychology* 2006;24(1):21-29.
56. Maycock B, Binns CW, Dhaliwal S, Tohotoa J, Hauck Y, Burns S, Howat P. Education and Support for Fathers Improves Breastfeeding Rates: A Randomized Controlled Trial. *J. Hum. Lact.* 2013;29(4):484-490.
57. Harwood K, McLean N, Durkin K. First-time mothers' expectations of parenthood: What happens when optimistic expectations are not matched by later experiences? *Dev. Psychol.* 2007;43(1):1-12.
58. Delmore-Ko P, Pancer SM, Hunsberger B, Pratt M. Becoming a parent: the relation between prenatal expectations and postnatal experience. *J. Fam. Psychol.* 2000;14(4):626-640.
59. Australian Bureau of Statistics: 6227.0 - Education and Work, Australia, May 2013 [Internet]. Belconnen ACT Australia: Australian Bureau of Statistics: 2013 November 29 [cited 2013 December 4]. Available from: <http://www.abs.gov.au/ausstats/abs@.nsf/Products/6227.0~May+2013~Main+Features~Attainment?OpenDocument>
60. Golding J, Pembrey M, Jones R. ALSPAC--the Avon Longitudinal Study of Parents and Children. I. Study methodology. *Paediatr Perinat Epidemiol* 2001;15(1):74-87.
61. Green SB, Yang Y. Commentary on coefficient alpha: A cautionary tale. *Psychometrika* 2009; 74(1):121-135.
62. Sijtsma K. On the use, the misuse, and the very limited usefulness of Cronbach's alpha. *Psychometrika* 2009;74(1):107-120.
63. Touwen BCL, Huisjes HJ, Jurgens-vd Zee AD, Bierman-van Eendenburg MEC, Smrkovsky M, Olinga AA. Obstetrical condition and neonatal neurological morbidity. An analysis with the help of the optimality concept. *Early Hum Dev* 1980; 4(3):207-228.
64. Rutter M, Thorpe K, Greenwood R, Northstone K, Golding J. Twins as a natural experiment to study the causes of mild language delay: I: Design; twin-singleton differences in language, and obstetric risks. *J Child Psychol Psychiatry* 2003;44(3):326-341.
65. Dunn J, Deater-Deckard K, Pickering K, O'Connor TG, Golding J, the ALSPAC Study Team. Children's Adjustment and Prosocial Behaviour in Step-, Single-parent, and Non-stepfamily Settings: Findings from a Community Study. *J Child Psychol Psychiatry* 1998;39(8):1083-1095.

66. Green JM, Coupland VA, Kitzinger J. Great expectations: a prospective study of women's expectations and experiences of childbirth. Books for Midwives Press Cheshire; 1998.
67. Redshaw M, Martin CR. Validation of a perceptions of care adjective checklist. *J. Eval. Clin. Pract.* 2009;15(2):281-288.
68. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. *Br. J. Psychiatry* 1987;150(6):782-786.
69. Mitchell-Box K, Braun KL. Fathers' thoughts on breastfeeding and implications for a theory-based intervention. *J. Obstet. Gynecol. Neonatal Nurs.* 2012;41(6):E41-E50.
70. Cast AD. Well-being and the transition to parenthood: An identity theory approach. *Sociological Perspectives* 2004;47(1):55-78.
71. St James-Roberts I, Gillham P. Use of a behavioural programme in the first 3 months to prevent infant crying and sleeping problems. *J Paediatr Child Health* 2001;37(3):289-297.
72. Symon BG, Marley JE, Martin AJ, Norman ER. Effect of a consultation teaching behaviour modification on sleep performance in infants: a randomised controlled trial. *Med J Aust* 2005;182(5):215-218.
73. Wan MW, Sharp DJ, Howard LM, Abel KM. Attitudes and adjustment to the parental role in mothers following treatment for postnatal depression. *J Affect Disord* 2011;131(1):284-292.
74. Kenny DA. Commentary: Dyadic analyses of family data. *J Pediatr Psychol* 2011;36(5):630-633.
75. Jenkins J, Rasbas J, Leckie G, Gass K, Dunn J. The role of maternal factors in sibling relationship quality: a multilevel study of multiple dyads per family. *J Child Psychol Psyc* 2012;53(6):622-629.

Current knowledge on this subject

- Rates of paternal postnatal depression approach those for mothers.
- Active and involved fathering is increasingly accepted and expected.
- Infant regulatory problems, especially sleep difficulties, are associated with maternal PND.

What this study adds

- Feeding difficulties were associated with paternal PND independent of psychosocial correlates such as social support and life events.
- This association is not moderated by the rigidity of parenting regulation beliefs.
- Given increasing expectations of involved fathering, role strain and role congruence for fathers may explain this association.

Declaration of Interest

The authors report no conflicts of interest.

Table 1. Means, standard deviations, and intercorrelations for all measures.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Infant age (weeks)	1	-.077	.048	-.005	-.050	-.011	-.005	.114	.082	.102	.187**	-.013	-.087
2 Infant sex		1	.046	.039	.134*	.144*	-.117	-.032	.027	-.031	-.093	-.114	-.150*
3 Father age			1	.176**	.006	-.105	-.097	-.089	-.048	-.043	.035	.047	.012
4 Father education				1	.077	-.135*	-.093	-.093	-.019	.090	.086	.000	-.011
5 Partner support					1	-.268**	-.258**	.010	.014	.118	.041	-.083	-.154*
6 Other support						1	-.149*	-.011	.047	.017	.015	.094	-.094
7 Life events							1	-.018	-.101	-.035	.061	.116	.356**
8 Regulation beliefs								1	.004	.011	.010	.054	.047
9 T _m									1	.694**	.515**	.272**	.063
10 T _f										1	.604**	.374**	.169*
11 Sleep behaviours											1	.345**	.173*
12 Feeding behaviours												1	.361**
13 EPDS													1
<i>M</i>	8.24	1.50	32.74	5.41	18.32	6.09	8.31	13.28	5.65	6.03	3.05	5.51	3.70
<i>SD</i>	5.21	0.50	5.33	1.74	3.52	2.85	5.75	3.98	3.53	2.94	1.99	2.16	3.70

Note: ** significant at the .01 level; * significant at the .05 level; EPDS = Edinburgh Postnatal Depression Scale; T_m = mother report infant temperament; T_f = father report infant temperament.

Table 2. Multiple regression analyses predicting depressive symptoms.

Model	R		B	SE	β	p	LB	UB	sr
1	.397	infant age	-0.072	0.048	-.101	.132	-0.166	0.022	-.101
		infant sex	-0.826	0.502	-.112	.102	-1.817	0.165	-.109
		Father age	0.035	0.047	.051	.456	-0.058	0.129	.050
		Father education	0.048	0.147	.023	.743	-0.242	0.338	.022
		Partner support	-0.100	0.078	-.095	.202	-0.254	0.054	-.085
		Other support	0.016	0.095	.012	.865	-0.172	0.204	.011
		Life events	0.209	0.045	.325	.000	0.120	0.298	.308
2	.418	infant age	-0.085	0.048	-.120	.081	-0.181	0.011	-.116
		infant sex	-0.835	0.501	-.113	.097	-1.823	0.153	-.111
		Father age	0.044	0.048	.064	.353	-0.050	0.138	.062
		Father education	0.067	0.147	.031	.650	-0.223	0.357	.030
		Partner support	-0.106	0.078	-.101	.175	-0.261	0.048	-.090
		Other support	0.019	0.096	.014	.848	-0.172	0.209	.013
		Life events	0.217	0.045	.338	.000	0.128	0.307	.317
		Regulation beliefs	0.068	0.063	.073	.281	-0.056	0.192	.072
		T_m	0.124	0.070	.119	.079	-0.015	0.263	.117
RxT_m	0.010	0.280	.002	.972	-0.544	0.564	.002		
3	.450	infant age	-0.084	0.046	-.118	.067	-0.174	0.006	-.115
		infant sex	-0.794	0.472	-.108	.094	-1.725	0.137	-.105
		Father age	0.041	0.045	.060	.360	-0.048	0.130	.057
		Father education	0.032	0.140	.015	.818	-0.244	0.308	.014
		Partner support	-0.075	0.074	-.072	.310	-0.221	0.070	-.064
		Other support	-0.008	0.091	-.006	.932	-0.186	0.171	-.005
		Life events	0.215	0.042	.334	.000	0.131	0.299	.316
		Regulation beliefs	0.069	0.059	.074	.245	-0.048	0.186	.073
		T_f	0.237	0.080	.189	.003	0.080	0.395	.186
RxT_f	0.281	0.228	.080	.218	-0.168	0.730	.077		
4	.514	infant age	-0.072	0.045	-.101	.112	-0.161	0.017	-.097
		infant sex	-0.554	0.464	-.075	.233	-1.468	0.360	-.073
		Father age	0.024	0.044	.034	.590	-0.063	0.111	.033
		Father education	0.027	0.137	.013	.846	-0.244	0.297	.012
		Partner support	-0.050	0.072	-.048	.486	-0.192	0.092	-.042
		Other support	-0.057	0.090	-.044	.529	-0.234	0.120	-.038
		Life events	0.191	0.042	.297	.000	0.109	0.273	.277
		Regulation beliefs	0.052	0.058	.056	.371	-0.062	0.166	.054
		T_f	0.088	0.101	.070	.383	-0.111	0.287	.053
		Sleep behaviors	0.047	0.148	.026	.748	-0.243	0.339	.020
		Feeding behaviors	0.453	0.119	.265	.000	0.218	0.688	.231
		RxT_f	0.204	0.317	.058	.521	-0.422	0.829	.039
RxS	-0.080	0.308	-.023	.794	-0.687	0.526	-.016		
RxF	0.144	0.247	.041	.561	-0.343	0.631	.035		

Notes: Significant predictors shown in bold; T_m = infant temperament mother report; T_f = infant temperament father report; interaction terms are the product of respective z scores; RxT_m = interaction of regulation beliefs and mother report infant temperament; RxT_f = interaction of regulation beliefs and father report infant temperament; RxS = interaction of regulation beliefs and infant sleep behaviors; RxF = interaction of regulation beliefs and infant feeding behaviours; LB = lower bound of 95% confidence interval of B; UB = upper bound of 95% confidence interval of B; sr = semi-partial correlations for each predictor.