

Maternal anxiety, risk factors and parenting in the first post-natal year

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Abstract

Background The antecedents and consequences of maternal post-natal anxiety have received comparatively less attention than depression despite being one of the most frequently reported mental health difficulties experienced by parents following childbirth. The aim of this study was to extend emerging literature on post-natal anxiety by investigating the prevalence of maternal anxiety symptoms, and its relationship with parenting behaviours (i.e. warmth, hostility) and experiences (i.e. parenting efficacy and satisfaction) within the first post-natal year. The psychosocial risk factors for post-natal anxiety symptoms were also explored.

Methods A community sample of 224 Australian mothers of infants (aged 0–12 months) completed a self-report questionnaire.

Results Mothers in the current sample reported significantly more symptoms of anxiety compared with a normative sample. Approximately 18% of mothers reported mild to extremely severe symptoms of anxiety, with a high proportion experiencing co-morbid depressive symptoms. Maternal anxiety was associated with low parenting warmth, involvement, efficacy and satisfaction, and high parenting hostility. Yet, co-morbid depression and anxiety was more strongly associated with these parenting behaviours and experiences than anxiety alone.

Conclusion A range of psychosocial risk factors (e.g. education, sleep, relationship quality) were associated with maternal post-natal anxiety symptoms, providing opportunities for early identification and targeted early intervention.

Keywords

anxiety, maternal, parenting behaviours, post-natal, risk factors

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Maternal mental health difficulties are common during the post-natal period, yet the vast majority of studies have focused on depressive symptoms (O'Hara & Swain 1996; Paulson *et al.* 2006; Buist *et al.* 2008). The relationship between depressive symptoms and parenting behaviours (e.g. engagement, warmth and irritability) during the post-natal period has also been well documented (Williams & Koran 1997; Lovejoy *et al.* 2000; Paulson *et al.* 2006). The risk factors for, and the impact of post-natal anxiety have received comparatively less attention despite being commonly reported among mothers following childbirth (Matthey *et al.* 2003; Jones & Prinz 2005; Reck *et al.* 2008).

Anxiety is characterized by symptoms including worry, restlessness, agitation, sleep disturbance, and apprehension (American Psychiatric Association 1994). An Australian community sample of 408 mothers found that 16% experienced an anxiety disorder at 6 weeks postpartum, and a further 4% reported co-morbid depression and anxiety (Matthey *et al.* 2003). Similarly, Reck and colleagues (2008) found in a community sample of German mothers that 11% of mothers had an anxiety disorder in the first 3 months postpartum, and 2% of these were new post-natal onset. Such findings highlight that the post-natal period can be a time for the development or exacerbation of anxiety symptoms (Wenzel *et al.* 2003). Clinical

samples also indicate that approximately a third of women with pre-existing panic disorder (Cohen *et al.* 1994) and obsessive compulsive disorder (Williams & Koran 1997) deteriorated in the post-natal period. Current evidence suggests that anxiety is at least, if not more common than symptoms of depression in the post-natal period, warranting further investigation and understanding of its risk factors and impact on parenting.

Maternal anxiety and parenting

Although the prevalence of maternal post-natal anxiety is high, research into its potential effects on parenting behaviours has been slow to emerge. Several studies have reported that mothers who are anxious may overstimulate their infants, display intrusive or inconsistent behaviour towards their infant, and engage in behaviour that is insensitive to infants' cues (Barnett 1986; Feldman 2007; Murray *et al.* 2007; Feldman *et al.* 2009). Lack of sensitivity to such cues may contribute to and exacerbate sleep, settling and feeding problems in infants. Several studies have reported that post-natal anxiety symptoms were associated with increased infant negative emotionality, and difficult child temperament and behaviour (McMahon *et al.* 2001; Feldman *et al.* 2009). The longer-term effects on children have been noted by O'Connor and colleagues (2002) who found that late antenatal and post-natal maternal anxiety at 21 months significantly predicted inattention and hyperactivity in children at 4 years of age.

High maternal anxiety has also been associated with decreased parental self-efficacy (Telleen 1990; Porter & Hsu 2003; Feldman *et al.* 2009). Parental self-efficacy refers to parents' beliefs about their parenting abilities and satisfaction in their parenting role (Johnston & Mash 1989). Porter and Hsu (2003) found that high anxiety was associated with lower parental self-efficacy in first-time mothers at 1 month postpartum, but not at 3 months postpartum. Over time, parents may learn ways to adapt and care for their new infant, resulting in increased feelings of satisfaction, confidence and competence, and thus reducing symptoms of anxiety. This highlights that further research into the course of anxiety across the post-natal period and beyond is needed in addition to studies to understand the impact on parenting and child outcomes.

Factors associated with maternal anxiety in the post-natal period

A better understanding of why some mothers are at risk of heightened anxiety during the post-natal period is also needed. This period is a demanding life stage, where concerns about

infant health are combined with new responsibilities, changing relationship dynamics, a substantive unpaid workload, sleep deprivation, and the physical demands of recovery from birth and breastfeeding. The presence of environmental stressors (e.g. finances, household duties, relationships) are known to significantly predict anxiety in the post-natal period (Wenzel *et al.* 2003). Socio-economic disadvantage, younger maternal age and low educational attainment have also been associated with increased likelihood of reporting elevated post-natal anxiety (Cohen *et al.* 1994; Wenzel *et al.* 2005). Furthermore, poor sleep quality and fatigue have been found to be associated with well-being difficulties, including anxiety in parents of young children (Pilcher *et al.* 1997; Cooklin *et al.* 2011; Giallo *et al.* 2012). Despite this emerging body of research, a more comprehensive understanding of the psychosocial risk factors associated with post-natal anxiety is needed.

The current study

We sought to extend the emerging literature by investigating the relationship between anxiety symptoms and parenting behaviours (i.e. warmth, irritability, involvement) and experiences (i.e. efficacy, satisfaction, parent-child interactions). Parenting behaviours and experiences were of particular interest as they have the potential to affect parent-child interactions (Feldman *et al.* 2009), and outcomes for children including difficult behaviour (McMahon *et al.* 2001; O'Connor *et al.* 2002; Creswell *et al.* 2013) and infant sleep, settling and feeding (Barnett 1986). Specifically, the aims of this study were to:

1. Report on the extent to which mothers experience anxiety symptoms, including co-morbidity with depression symptoms, in the first year after having a baby.
2. Explore the relationship between anxiety and parenting efficacy and satisfaction, difficult parent-child interactions, parenting warmth and hostility, and involvement in everyday learning activities.
3. Identify psychosocial factors associated with anxiety symptoms, including demographic characteristics, socio-economic position, quality of sleep, diet and exercise, relationship quality, and infant characteristics (e.g. age, gender, behaviour).

Method

Participants

This study used a subset of data from a larger community survey of 1400 Australian parents of young children (0-6 years

of age) about parent well-being and parenting in the early childhood period (Cooklin *et al.* 2011). Further details pertaining to the recruitment and methodology of this study are detailed elsewhere (see Cooklin *et al.* 2011). Ethics approval was granted by the Victorian Government Department of Human Services Research Ethics Committee, Australia.

Given that the current study was interested in maternal anxiety in the first post-natal year, a subset of 264 mothers with children aged 0–12 months were identified. Of these, 40 mothers had no data on the variables of interest in this study and were excluded from the analysis. The final sample size was 224, and their characteristics are presented in Table 1. The majority of mothers were in a couple relationship, born in Australia, spoke English at home, were not in paid employment and had a university education. There were no significant differences between mothers in the final sample and those excluded from analysis on any of the demographic characteristics.

Measures

Demographic information

Demographic information pertaining to age and gender of the parent and their children, marital status, main language spoken at home, level of education and employment status was collected. Socio-economic status was assessed using the Australian Bureau of Statistics, Socio-Economic Indexes for Areas Index of Relative Socioeconomic Disadvantage (SEIFA; Trewin 2003). Based on population census data from 2001, the SEIFA is estimated based on income, educational attainment and unemployment according to local government areas. Scores have been standardized to a distribution with a mean of 1000 (SD = 100), with higher scores reflecting residence in an area of relatively higher socio-economic advantage. Mothers in the current sample were from a slightly more advantaged socio-economic area as evident by their mean SEIFA score.

Variable	Current sample	Comparison with Australian population
Maternal age (<i>M</i> , <i>SD</i>)	32.57 years (4.44) Range: 18–43 years	29.9 years†
Age of focus child in months (<i>M</i> , <i>SD</i>)	6.09 (2.96) Range: 0–11mths	
Family type (<i>n</i> , %)		
Two-parent family	216 (96.4)	78.0%‡
Single-parent family	8 (3.6)	
Country of birth (<i>n</i> , %)		
Australia	186 (83.0)	74.7%†
Other	37 (16.5)	
Not reported	1 (0.4)	
Language spoken (<i>n</i> , %)		
English only	217 (96.9)	79.0%§
Bilingual	7 (3.1)	
Employment status (<i>n</i> , %)		
Employed full-time	38 (17.0)	8.0%¶
Employed part-time	64 (28.6)	32.0%¶
Not in paid employment	122 (54.5)	60.0%¶
Highest level of education completed (<i>n</i> , %)		
High school, TAFE, Trade Certificate, Diploma	91 (40.6)	
Tertiary (degree, post-graduate degree)	133 (59.4)	29%††
SEIFA‡‡ Index of Relative Socioeconomic Disadvantage (<i>M</i> , <i>SD</i>)	1023.04 (92.51)	
Number of children in the family (<i>M</i> , <i>SD</i>)	1.71 (0.77)	

Table 1. Sample characteristics (*N* = 224)

†Laws *et al.* (2010).

‡Australian Bureau of Statistics (2007) Australian Social Trends. Cat. no. 4102.0. Canberra: Australian Bureau of Statistics.

§Australian Bureau of Statistics (2007) Social Trends reference, above.

¶Australian Bureau of Statistics (2007) Social Trends reference, above.

††Australian Bureau of Statistics (2007) Social Trends reference, above.

‡‡Indexes of Socio-Economic Disadvantage for Areas (Trewin 2003).

Depression Anxiety Stress Scale-21

Depression Anxiety Stress Scale-21 (DASS-21; Lovibond & Lovibond 1995) assesses the negative emotional states of depression, anxiety and stress during the last week. The seven Anxiety subscale items and seven Depression subscale items are rated on a four-point scale, ranging from 0 = *never* to 3 = *almost always*. Higher scores reflect higher anxiety and depressive symptoms. Cronbach's α for the current sample was 0.77 for the Anxiety subscale and 0.88 for the Depression subscale.

Parenting Sense of Competence Scale

Parenting Sense of Competence Scale (PSOC; Abidin 1986) is comprised of the Satisfaction subscale which assesses enjoyment in the parenting role, while the Efficacy subscale assesses perceived knowledge, confidence and competence in parenting. The 16 items are rated on a six-point scale, where 1 = *strongly agree* and 6 = *strongly disagree*. The PSOC has demonstrated good reliability and validity (Rogers & Matthews 2004), and Cronbach's α for the current sample was 0.75 for the Satisfaction scale and 0.76 for the Efficacy scale.

Parenting practices: parental warmth, parental hostility and parental involvement

Parenting practices: parental warmth, parental hostility and parental involvement were taken from the Growing Up in Australia: Longitudinal Study of Australian Children (Sanson *et al.* 2002). The parenting warmth subscale assesses self-reported expressions of affection, intimacy and closeness towards the child, while parenting hostility assesses irritability, frustration and anger towards the child. The parent involvement subscale assesses the extent to which parents engage in shared activities with the child such as playing and reading together. Higher scores on each of these three scales indicate greater warmth, hostility and involvement, respectively. Cronbach's α for the parenting warmth, hostility and involvement subscales were 0.84, 0.84 and 0.65, respectively.

Parenting Stress Index – Short Form

Parenting Stress Index – Short Form (PSI; Rychnovsky & Beck 2006) is a widely used self-report assessment of parents' stress associated with the parenting role. The short form consists of 36 items assessing three subscales: parental distress, parent-child dysfunctional interaction and difficult child. The latter two were

used in the present study. The parent-child dysfunctional interaction subscale assesses the degree to which the child does not meet the parent's expectations or the degree to which the parent feels alienated from the child (e.g. 'My child rarely does things for me that make me feel good'). The difficult child subscale assesses parent perceptions of the degree to which the child displays difficult or demanding behaviours such as being easily upset and fussing (e.g. 'I feel that my child is very moody and easily upset'). Items are rated on a five-point scale, 1 = *strongly disagree* to 5 = *strongly agree*, where higher scores indicate more dysfunctional parent-child interactions and perceived difficult child behaviours. Cronbach's α for the parent-child dysfunctional interaction and difficult child subscales were 0.90 and 0.91, respectively.

Quality of diet and exercise

Two items asking parents to rate the quality of their diet and physical activity on a five-point scale ranging from 0 = *poor* to 4 = *excellent*, were developed for the purposes of this study.

Pittsburgh Sleep Quality Index

Pittsburgh Sleep Quality Index (PSQI; Buysse *et al.* 1989) is an 18-item self-report instrument assessing self-reported duration, quality, patterns and disturbances of sleep, with higher scores indicating poorer quality sleep. Cronbach's α for the current sample was 0.83.

Relationship Quality Index

Relationship Quality Index (RQI; Norton 1983) is a six-item measure of satisfaction, security and happiness within the couple relationship, with higher scores reflecting a more satisfying intimate relationship. Cronbach's α for the current sample was 0.96.

Parent Social Support Index

Parent Social Support Index (PSSI; Telleen 1990) measures parents' perceived need for emotional and practical forms of social support in the last month, with higher scores indicating greater need for support. Cronbach's α for the current sample were 0.82.

Results

Maternal anxiety

A one-sample *t*-test was used to compare mothers' DASS-21 anxiety subscale scores with available Australian normative data

(Crawford *et al.* 2011). Combined normative data for males and females were used in Crawford and colleagues' (2011) sample as no significant gender differences were found, this sample consisted of 497 adults aged between 18 and 86 years. Mothers in the present sample reported significantly higher anxiety ($M = 4.21$, $SD = 5.44$) than the normative sample ($M = 3.36$, $SD = 5.07$), $t(223) = 2.35$, $P = .02$, Cohen's $d = 0.16$ (95% confidence interval = 0.01–0.32), and this was associated with a small effect size.

The percentage of mothers in the normal and clinical ranges on the DASS-21 anxiety and depression subscales are presented in Table 2. The proportion reporting symptoms in the mild to extremely severe ranges were 18.3% for anxiety and 28.6% for depression. The proportion of the total sample reporting elevated clinically significant symptoms (mild to extremely severe ranges) on both the anxiety and depression subscales was 13.4% ($n = 30$); 4.9% ($n = 11$) on anxiety subscale alone; and 15.2% ($n = 34$) on the depression subscale alone.

Relationships between maternal anxiety and parenting

Correlations between anxiety and the parenting variables were small but significant, with high anxiety associated with low parental efficacy, $r(N = 224) = -0.25$, $P < 0.001$; low parenting satisfaction, $r(N = 224) = -0.42$, $P < 0.001$; more parent–child

dysfunctional interactions, $r(N = 224) = 0.24$, $P < 0.001$; lower parenting warmth, $r(N = 224) = -0.20$, $P = 0.003$; lower parent involvement in every day learning activities, $r(N = 224) = -0.15$, $P = 0.024$; and higher parenting irritability, $r(N = 224) = 0.18$, $P = 0.007$.

Relationships between the non-clinical and clinically significant groups (Table 2) and observed values on the parenting variables were analysed using multivariate analysis of variance (MANOVA). This analysis examines the difference in means between two or more groups on several dependent variables simultaneously, which reduces the risk of Type 1 errors associated with running multiple ANOVAs for each dependent variable. A significant overall multivariate effect was found, Wilks' $\Delta = 0.65$, $F(6, 209) = 5.43$, $P < 0.001$, partial $\eta^2 = 0.13$. Univariate ANOVAs revealed significant differences at $P < 0.001$ between the non-clinical and clinical groups for each variable except parent involvement (see Table 3). Figure 1 presents z-score mean values for each group across the parenting variables.

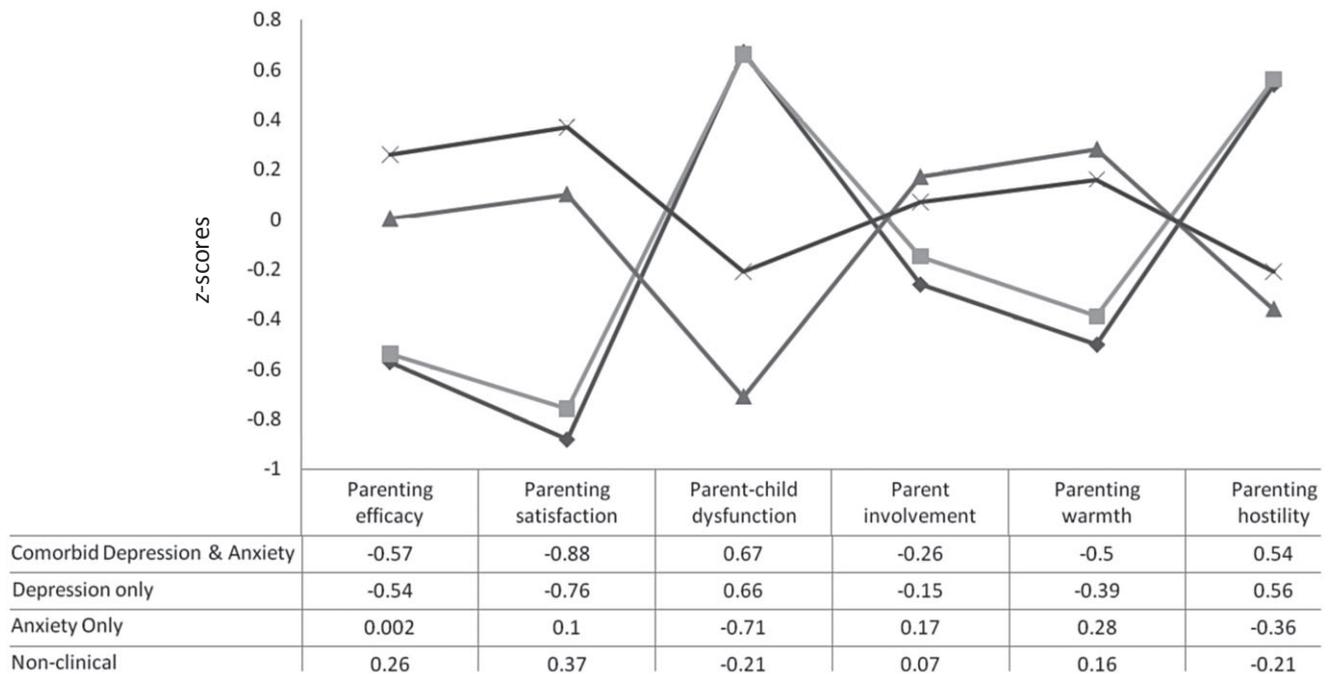
Tukey's *post-hoc* comparisons revealed that the co-morbid symptoms and depression only groups had significantly lower parenting efficacy scores than the non-clinical group ($P < 0.001$). With respect to parenting satisfaction, the co-morbid symptoms group had significantly lower scores than the anxiety only ($P = 0.006$) and non-clinical groups ($P < 0.001$), while the depression only group had significantly lower scores than the anxiety only ($P = 0.02$) and non-clinical groups ($P < 0.001$). For parent–child dysfunction, the co-morbid symptoms group had significantly higher levels of parent–child dysfunction than the anxiety only and non-clinical symptoms groups ($P < 0.001$), while the depression only group had higher levels than the anxiety only and non-clinical groups ($P < 0.001$). For parenting warmth, the non-clinical group had significantly higher scores than the co-morbid symptoms ($P = 0.006$) and depression only groups ($P = 0.025$). Finally, the co-morbid symptoms group had significantly higher parent hostility scores than the anxiety only ($P = 0.042$) and non-clinical groups ($P < 0.001$). Furthermore, the depression only

Table 2. Percentage of mothers in the normal and clinical ranges on the Depression Anxiety Stress Scale-21 Anxiety and Depression subscales ($N = 224$)

Range	Anxiety n (%)	Depression n (%)
Normal	183 (81.7)	160 (71.4)
Mild	11 (4.9)	27 (12.1)
Moderate	17 (7.6)	24 (10.7)
Severe	6 (2.7)	9 (4.0)
Extremely severe	7 (3.1)	4 (1.8)

Table 3. Comparisons between the non-clinical and clinical groups on the parenting variables

	Normal range		Anxiety only		Depression only		Co-morbid depression and anxiety		F	P	η^2
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)					
Parenting efficacy	31.16	5.30	29.64	4.08	26.65	4.22	26.47	6.01	11.54	<0.001	0.14
Parenting satisfaction	37.87	5.87	36.00	6.23	30.00	5.06	29.13	6.33	29.85	<0.001	0.30
Difficult parent–child interactions	17.43	5.16	14.27	2.20	23.12	6.94	23.20	8.14	16.54	<0.001	0.19
Parent involvement	9.48	2.96	9.82	1.89	8.91	2.55	8.57	3.07	1.15	0.329	0.02
Parenting warmth	28.71	2.17	29.00	1.67	27.38	2.71	27.10	3.14	5.87	0.001	0.08
Parenting hostility	8.37	3.00	7.91	2.07	11.15	3.97	11.07	4.03	10.78	<0.001	0.13



X non-clinical; ▲ anxiety only; ■ depression only; ◆ co-morbid depression and anxiety.

Figure 1. Mean z-scores for the non-clinical and clinical groups across the parenting variables.

group had significantly higher scores than the anxiety only ($P = 0.03$) and non-clinical groups ($P < 0.001$).

Psychosocial factors associated with maternal anxiety

Prior to conducting the regression analysis, correlations were conducted to examine the relationships between anxiety and the demographic, child and psychosocial variables (see Table 4). Only the variables with significant zero-order correlations with anxiety were entered into the regression model. The model accounted for 26% of the variance in anxiety symptoms, ($R^2 = 0.26$, $Adj R^2 = 0.22$, $F(9, 203) = 7.50$, $P < 0.001$), with education level, sleep quality, quality of the couple relationship, perceived need for social support and difficult child behaviour providing a significant amount of unique predictive variability in the model (see Table 5). High levels of anxiety were associated with having a high school, TAFE (Technical and Further Education) or trade certificate, poorer sleep quality, poorer relationship quality, having a greater perceived need for support and higher levels of difficult child behaviour.

Discussion

This study examined the extent to which mothers participating in an Australian community-based survey experienced

anxiety symptoms in the first post-natal year. We found that 18% reported anxiety symptoms such as tension, worry and apprehension. Approximately 13% reported co-morbid symptoms of depression, and 5% reported anxiety alone. Compared with previous Australian research (Matthey *et al.* 2003), the extent to which mothers report anxiety symptoms and co-morbid depression was higher in the present study. This is likely due to our study employing a self-report screening instrument which is likely to yield a higher prevalence than a diagnostic instrument. Despite this, our findings also revealed that mothers in the current sample reported significantly higher symptoms of anxiety compared with Australian normative data. These findings highlight that mothers are at heightened risk of experiencing anxiety symptoms during the post-natal period.

The present study also investigated the relationships between post-natal maternal anxiety and parenting. We found that high symptoms of anxiety were associated with mothers' self-report of fewer close, warm and affectionate parent-child interactions and less involvement with their children in every day learning activities such as playing indoors and reading stories. Symptoms such as preoccupation with worries and physical tension may make it harder for mothers to relax and enjoy warm and affectionate times with their children. This was also reflected in the significant association between mothers' reports of difficulties in

Table 4. Correlations between maternal anxiety symptoms and potential predictor variables

	<i>M (SD)</i>	<i>r</i>	<i>P</i>
<i>Demographic factors</i>			
Maternal age	–	–0.04	0.570
Highest educational attainment†			
High school, TAFE or trade certificate	–	–0.18	0.007
Tertiary education			
Employment‡			
Employed – full- & part-time	–	–0.13	0.061
Not in paid employment			
Socio-economic status§	–	–0.01	0.910
Country of birth¶			
Australia	–	0.04	0.57
Outside Australia			
Language spoken at home††			
English	–	0.001	0.997
Language other than English			
Number of children in family‡‡			
First child	–	0.33	<0.001
More than one child			
<i>Child factors</i>			
Age of focus child in months	–	0.07	0.315
Child gender§§			
Male	–	–0.02	0.718
Female			
Difficult child behaviour	27.18 (7.83)	0.32	<0.001
Child's overall health quality	4.40 (0.75)	–0.14	0.042
<i>Psychosocial factors</i>			
Sleep quality (PSQI)	10.25 (3.24)	0.35	<0.001
Quality of diet	2.16 (1.03)	–0.18	0.007
Quality of exercise	1.34 (0.98)	–0.19	0.005
Couple relationship quality (RQI)	35.88 (8.46)	–0.23	<0.001
Social support need (PSSI)	19.38 (5.10)	0.32	<0.001

†1 = high school, trade certificate, 2 = tertiary education.

‡1 = employed, 2 = not in paid employment.

§SEIFA Index of Social Disadvantage.

¶1 = Australia, 2 = outside Australia.

††1 = English, 2 = language other than English.

‡‡1 = first child, 2 = more than one child.

§§1 = male, 2 = female.

TAFE; PSQI, Pittsburgh Sleep Quality Index; RQI; PSSI, Parent Social Support Index.

parent–child interactions (e.g. feeling less connected with their child). Anxiety may also impact on mothers' ability to recognize opportunities to engage in warm and affectionate behaviours with their children, which is consistent with previous research indicating that anxious mothers may be less sensitive to their children's cues (Barnett 1986; Murray *et al.* 2007; Feldman *et al.* 2009). Anxiety was also associated with increased irritability and frustration in the parent–child relationship. It is likely that the physical tension, irritability and agitation often associated with anxiety escalates quickly during stressful interactions with children, and this may result in increased frustration and yelling at

Table 5. Results of the regression analyses for maternal anxiety

Predictor variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>P</i>
Highest educational attainment†	–1.98	0.74	–0.18	–2.67	0.008
Number of children in family‡					
One	1.27	1.12	0.12	1.14	0.257
More than one					
Difficult child behaviour	0.11	0.05	0.16	2.15	0.032
Child's overall health quality	–0.06	0.49	–0.01	–0.12	0.906
Sleep quality (PSQI)	0.24	0.19	0.14	1.26	0.209
Quality of diet	0.35	0.42	0.06	0.83	0.410
Quality of exercise	0.02	0.41	0.004	0.05	0.960
Couple relationship quality (QMI)	–0.11	0.04	–0.16	–2.49	0.014
Social support need (PSSI)	0.21	0.08	0.19	2.70	0.008

†1 = high school, trade certificate, 2 = tertiary education.

‡1 = first child, 2 = more than one child.

PSQI, Pittsburgh Sleep Quality Index; RQI; PSSI, Parent Social Support Index.

the child. It may also be harder for mothers to think through appropriate alternative strategies for managing difficult parenting situations when experiencing such high levels of anxiety.

Anxiety and the less optimal parenting behaviours reported here have the potential to impact on mothers' perceptions of the quality of their relationship with their children and their parenting ability. We found that high anxiety was associated with mothers' reports of difficulties in the parent–child relationship such as perceptions that the child rejects them or that the child is not meeting their expectations. Closely related to this, we also found that high anxiety was associated with decreased parental self-efficacy. Perceptions of parenting challenges, along with the negative mood and cognitions (i.e. irritability, high expectations and preoccupation with worries) often associated with anxiety may undermine mothers' perceptions of their competence and erode their satisfaction in their parenting role. This, in turn, is likely to promote further anxiety. This is an important finding because low parental self-efficacy has been associated with coercive discipline and harsh parenting, and a tendency to give up when faced with difficult parenting challenges (Fox & Gelfand 1994; Coleman & Karraker 1997; Jones & Prinz 2005).

We also found that mothers who reported co-morbid depressive and anxiety symptom had more parenting difficulties (i.e. lower warmth and involvement, high hostility) and low parental self-efficacy than mothers who reported anxiety only. The level of distress associated with anxiety combined with depressive symptoms is likely to have a greater impact on parenting behaviour and how mothers feel about themselves as a parent. This highlights the importance of treating both sets of symptoms as interventions targeting one set may result in little improvement.

The final aim of the study was to identify psychosocial factors associated with post-natal anxiety. We found that lower educational attainment was associated with higher anxiety.

Lower educational attainment is a robust indicator of low socio-economic position, itself a risk factor for poorer mood and emotional well-being (Kahn *et al.* 2000; Lorant *et al.* 2003; Chen *et al.* 2005). Our findings suggest that socio-economically disadvantaged women may be more vulnerable during the post-natal period to anxiety as well as depressive symptoms, furthering the need for improved access to high-quality services and support for this vulnerable group.

We also found that a high perceived need for social support and poor couple relationship quality were associated with increased anxiety symptoms. Mothers with inadequate support may feel overwhelmed and isolated. Without an opportunity to normalize their experiences with others, this may lead to worry and concern. Similarly, being in unsatisfying, unsupportive or unhappy relationship may result in further worries and stress.

Difficult child behaviour (e.g. irritable, demanding, hyperactivity) and poor maternal sleep quality were associated with higher anxiety. This is not surprising as unsettled child behaviours such as fussing, poor eating and sleep habits can be worrying for parents, and these behaviours may further exacerbate feelings in anxious mothers. While cause and effect cannot be inferred, it is likely that providing mothers with support and psycho-education on normal infant behaviour along with ways to cope with difficult child behaviour might be effective in reducing symptoms of maternal anxiety. Furthermore, anxiety is a plausible cause of poor sleep quality, as well as a likely outcome of interrupted sleep often experienced in the post-natal period. While the direction of this relationship is not possible to ascertain in a study of this kind, normalizing infant sleep patterns, along with the practise of good sleep hygiene may be effective in supporting women experiencing higher anxiety symptoms.

Study limitations

There are several limitations to this study worth noting. First, a self-report measure of anxiety was used. This measure is not a diagnostic tool and no clinical interviews were conducted to confirm a diagnosis. Second, as this study used a cross-sectional design, causal relationships cannot be inferred. It is likely that a transactional relationship exists between maternal anxiety and the psychosocial and parenting factors investigated. Third, it is well established that a past history of mental health difficulties is a risk factor for mothers experiencing difficulties in the post-natal period (Cohen *et al.* 1994; Matthey *et al.* 2003; Wenzel *et al.* 2005) and this was not accounted for in the current study. Furthermore, there are likely to be numerous other factors that contribute to maternal anxiety in the post-natal period that were not presently assessed. For example, partner mental health, parenting stress

and coping styles might be relevant for future investigations. Finally, it was evident that mothers from more advantaged socio-economic areas participated in the study and the current findings may not be generalizable to mothers from more socio-demographically diverse backgrounds. It is likely that the current prevalence rate under-estimates the prevalence of anxiety symptoms among lower socio-economic populations.

Implications and conclusions

Despite these limitations, this study reveals that mothers are at heightened risk of anxiety symptoms during the post-natal period. While the primary focus of early screening and intervention in the post-natal period has focused on depression, these findings highlight that screening and targeted interventions to identify and address anxiety symptoms specifically are also needed. This study has identified some potential targets for psycho-education and intervention including promoting healthy sleep habits and other self-care behaviours; coping with and managing difficult child behaviours such as infant sleep and crying; and strengthening the couple relationship and social supports during the post-natal period. This is an important step towards not only promoting the well-being of mothers, but for strengthening optimal parenting behaviours and promoting parental self-efficacy which are important for children's short and long-term well-being and development. Psycho-education which normalizes experiences and helps mothers identify areas for support, enhancing their ability to engage in support may help alleviate symptoms of anxiety.

Key messages

- Approximately 18% of mothers in the present study reported mild to extremely severe levels of anxiety within the first post-natal year.
- Compared with mothers not experiencing clinically significant levels of anxiety, mothers reporting high anxiety symptoms were also more likely to report using ineffective parenting behaviours (e.g. less warmth, affection and involvement, and more irritability and frustration the parent-child relationship).
- Factors associated with mothers' report of clinically significant levels of anxiety included lower educational attainment, lower socio-economic position, high perceived need for social support, poor couple relationship, difficult child behaviour and poor maternal sleep quality.

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