Early post-partum adjustment and admission to parenting services in Victoria, Australia after assisted conception

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BACKGROUND: Higher rates of admission to residential early parenting services (REPSs) after assisted conception compared with spontaneous conception have been reported. The aim of this study was to characterize early post-partum psychological functioning and the rate of, and risks factors for, admission to REPSs in women conceiving with assisted reproductive technology (ART) in Australia.

METHODS: A consecutive cohort of women who had conceived through ART was recruited systematically in early pregnancy. At 3 months post-partum, participants completed postal questionnaires which included a new measure of the degree of difficulty involved in conceiving, the Burden of Infertility and Treatment (BIT) scale.

RESULTS: Of 166 women who participated, 8% had already been admitted to a REPS within 3 months, which is a higher rate compared with other women in the first 12 months (5%). Compared with community samples of new mothers, there was no difference in rate of depression. A higher proportion reported dysregulated infant behaviours (P = 0.0001) and a smaller proportion was breast feeding exclusively (P = 0.0001). Greater difficulty conceiving (higher BIT score) was associated with lower maternal confidence.

CONCLUSIONS: Clinical care of the increasing group of women who conceive with ART should include explicit assessment of early post-partum psychological functioning and early intervention if difficulties in managing infant behaviour are reported.

Key words: assisted reproductive technology / women / post-partum mood / parenting services

Introduction

Involuntary childlessness affects a substantial proportion of couples (Boivin et al., 2007) and the use of IVF and other assisted reproductive technologies to treat infertility (ART) is increasing in developed countries (Adamson et al., 2006). For most couples, a diagnosis of infertility represents a major life crisis and there is unequivocal evidence that an unfulfilled wish for a child has an adverse effect on life satisfaction, self-esteem and self-confidence (Wright et al., 1989; Greil, 1997). ART procedures are very physically and emotionally demanding, particularly for women and treatment is associated with fluctuations in symptoms of anxiety and depression, and diminished self-confidence (Eugster and Vingerhoets, 1999; Verhaak et al. 2007).

The birth of a child requires women to make major adaptations to the unpaid workload of infant care, while adjusting simultaneously to reduced autonomy and liberty and to the disenfranchised losses of professional identity, capacity to generate an income and social and leisure activities. Severe occupational fatigue associated with interrupted and insufficient sleep, anxiety about the baby’s health and development, social isolation and feelings of insufficient support are common. These realities, especially for first-time mothers, are potentially destabilizing to mental health. Evans et al. (2001) assessed mood in pregnancy (18 and 32 weeks gestation) and postnatally (8 weeks and 8 months) in a community cohort of 9028 women and found that 25% had clinically significant symptoms of depression at one or more of these assessment times. Non-psychotic clinical depression is reported to occur in 10–13% of women in the first post-partum year (O’Hara and Swain, 1996). Major risk factors are past history, including antenatally, of depression, a poor relationship with the intimate partner, socioeconomic disadvantage and unwanted pregnancy.

Adjustment to motherhood after infertility and ART treatment has been investigated in a number of studies, using a range of methods and the findings are inconsistent. Some found no differences in parenting stress between groups of women who had conceived with ART or...
spontaneously (Colpin et al., 1999; Gibson et al., 2000; Glazebrook et al., 2001), others reported fewer adjustment problems after ART (Greenfeld and Klock, 2001; Repokari et al., 2006) and a group of studies identified more parenting stress among primiparous mothers of ART-conceived multiple infants than in comparison groups (Garel and Blondel, 1992; Colpin et al., 1999; Baor et al., 2004; Glazebrook et al., 2004). Differences are probably attributable to differences in conceptualization of relevant aspects of psychological functioning and limitations in approach which are apparent in most studies (Hammarberg et al., 2008b). In particular very few have assessed the degree of difficulty in conceiving and whether it is associated with psychological adjustment to early motherhood.

Most Australian states have a unique clinical resource: non-psychiatric day-stay and residential programs to assist women who are experiencing early parenting difficulties. Day attendance programmes provide advice and assistance about lactation and management of infant behaviour. Additionally, women with mild to moderate depression, anxiety and clinically significant maternal exhaustion or whose infants have severely dysregulated sleep patterns, persistent inconsolable crying or feeding difficulties can be admitted with their baby(ies) to residential early parenting services (REPSs). Treatment at these services involves individualized supported education in infant care and participation in a structured psycho-educational programme during a three-to-five-night stay (Don et al., 2002; Fisher et al., 2004; Matthey and Speyer, 2008). Some states also have dedicated psychiatric mother baby units for the care of women with more severe psychiatric illness post-partum (Buist et al., 2004). In Victoria, one Australian state, approximately 5% of mothers are admitted to a REPS in the first postpartum year and 1% are admitted to a psychiatric mother baby unit (Hammarberg, 2006).

There is growing evidence that rates of admission to REPSs are higher among women who have conceived with ART than in those who have conceived spontaneously. The first observation was made by Barnett et al. (1993) who reported that 9% of a consecutive cohort of 100 women admitted to a REPS in Sydney had a past history of infertility. Subsequently, Fisher et al. (2002) found that 6.5% of 109 mothers admitted consecutively to Masada Private Hospital Mother Baby Unit (MPHMBU), a private sector REPS in Melbourne in 1997, had conceived with ART, an apparent 5-fold over representation compared with the national rate of ART births of 1.2% at that time (Hurst et al., 1999). As a result of this observation, a new item assessing mode of conception was added to MPHMBU admission protocols in July 2000. A subsequent systematic audit of medical records from the period July 2000 to August 2002 revealed that 6% of the 745 women admitted to the service had conceived with ART compared with a general population assisted conception birth rate of 1.5% at that time (RR 4.0, 95% CI 3.0–5.4) (Fisher et al., 2005). It was possible that there was an over-representation of ART conception in women attending this private hospital service as it is only accessible to those who are relatively socioeconomically advantaged and hold private health insurance. A survey was then undertaken in a public access REPS in a more disadvantaged region of Melbourne. Of 79 women admitted consecutively to this service, 6.3% had conceived with ART, a rate four times higher than the national rate of ART births at that time (Fisher and Rowe, 2005).

The overall aims of the current study were to characterize pregnancy and post-partum psychological functioning in women conceiving with ART and to identify the rate of, and risk factors for, admission to REPSs, post-partum mental health problems and low maternal confidence. It was a prospective longitudinal study of a consecutive cohort of women who had conceived with ART and who were recruited systematically in early pregnancy. Pregnancy psychological functioning and the experiences of birth and post-natal health care of the cohort have already been reported (Fisher et al., 2007; Hammarberg et al., 2008a). Participants in this study appeared to be at low risk of post-partum depression as they were socioeconomically advantaged, experienced their intimate partners as being highly affectionate, supportive and trustworthy and not controlling or domineering, had desired pregnancies and had intense protective attachments to the fetus and low rates of probable antenatal depression (Fisher et al., 2007). Participants were however, significantly older and were more likely to be first-time mothers, to have a Caesarean birth and/or twins and to be disappointed with intrapartum experiences than comparison groups. Additionally more of the participants recalled feeling highly anxious about caring for the baby at the point of discharge from the maternity hospital (Hammarberg et al., 2008a).

The aim of this phase of the study was to assess rates of admission to REPSs, infant behaviour and temperament and maternal mood and confidence three months post-partum.

Materials and Methods

The study was approved by the Research and Ethics Committees of the Royal Women’s Hospital, the Freemasons Hospital Ethics Committee, and the University of Melbourne’s Human Research Ethics Committee, all located in Melbourne, the capital city of Victoria, Australia.

Study population

The study setting and the method of recruitment have been described elsewhere (Fisher et al., 2007; Hammarberg et al., 2008a). In brief, a consecutive cohort of women treated at two large ART centres in Melbourne between July and December 2001, with an ultrasound confirmed pregnancy at 6 weeks gestation and sufficient English to complete questionnaires were invited to participate. Sample size calculation was based on a conservative estimate that the rate of admission to REPSs in the first 18 months after birth would be three times higher in the study population than among all women who gave birth in Victoria in 2002 (15 versus 5%). A sample of 144 participants was needed to detect this difference in admission rates with 95% power at the 5% level, using a 2-sided test based on a single proportion. To allow for a 20% attrition rate, a sample of at least 180 women was required.

Due to the difficulties in identifying an appropriate control group for the heterogeneous group of women who conceive with ART, comparisons were made with state and national perinatal data generated by the Australian Bureau of Statistics (ABS), the Australian Institute of Health and Welfare National Perinatal Statistics Unit and the Victorian Perinatal Data Collection Unit, all from the general population, almost all of whom will have conceived spontaneously.

Materials

Data were collected in this study by brief structured telephone interviews and postal questionnaires comprising study specific questions and standardized validated self-report measures, selected to permit comparison with existing Australian and international evidence.
Study-specific questions

The study specific questions at 3 months post-partum included items assessing recollections of childbirth, current health, available support, method of infant feeding and the infant’s health and development. Fixed choice response formats included ‘Yes’ or ‘No’ (e.g. the question ‘In general, do you think you have had enough help since coming home from hospital’); nominal response alternatives (e.g. for the question ‘How are you feeding your baby now?’ response options included 7 methods of infant feeding), and ordinal response alternatives (e.g. for the question ‘How would you describe your health now?’ the response alternatives were ‘Excellent’, ‘Very good’, ‘Good’, ‘Fair’ and ‘Poor’). It also included an item assessing self-rated maternal confidence used in a population based Australian study of new mothers (Brown et al., 2001), and one indicating early parenting service use.

Standardized psychometric measures

Standardized, valid and reliable psychometric instruments assessing mood, perception of quality of the relationship with the partner, personality, infant temperament and a study specific measure of the degree of difficulty involved in conceiving were incorporated in the questionnaire.

Mood

Non-somatic symptoms of depression were assessed using The Edinburgh Post-natal Depression Scale (EPDS) (Cox et al., 1987). It is a 10-item self-report screening instrument for post-natal depression with demonstrated high specificity and sensitivity. The Profile of Mood States (POMS) is a report screening instrument for post-natal depression with demonstrated high specificity and sensitivity. The Profile of Mood States (POMS) is a 65-item mood adjective checklist designed to assess mood variations in psychologically normal populations, particularly in response to intervening events (McNair et al., 1971). It yields subscale scores on one positive (Vigour-Activity) and five negative (Tension-Anxiety, Depression-Dejection, Fatigue-Inertia, Anger-Hostility and Confusion-Bewildement) mood dimensions.

Quality of relationship with intimate partner

Quality of relationship with an intimate partner can be both protective or, if functioning poorly, increase risk of depression after childbirth. The Intimate Bonds Measure (IBM) is a 24-item self-report measure developed in Australia that assesses perceived quality of the relationship with the intimate partner and yields two independent subscales (Wilhelm and Parker, 1988). The Care subscale reflects experiences of emotional and physical care including warmth, consideration, affection and companionship and the Control dimension assesses perceived dominance, intrusiveness and authoritarian attitudes and behaviours.

Personality

The Vulnerable Personality Style Questionnaire (VPSQ) is a nine item personality measure for identification of characteristics that increase risk of depression, in particular at times of life change, including after the birth of a baby (Boyce et al., 2001). In this study, only the Vulnerability subscale, which includes worry, inhibition, oversensitivity to the opinions of others and lack of assertiveness was used.

Infant temperament

We have shown that infants admitted to REPSs have temperaments in the more difficult to manage end of the range (Fisher et al., 2004). In this study, maternal assessments of infant temperament were made using the Early Infancy Temperament Questionnaire (EITQ) (Medoff-Cooper et al., 1993), a 76 item instrument to document infant reactions and behaviours. It yields nine subscales reflecting independent dimensions of infant temperament. The EITQ also includes 10 items assessing parent’s general impression (GI) of their infant compared with other infants of the same age.

Burden of infertility and treatment

In order to quantify the burden of infertility and infertility treatment, seven infertility and treatment related items were used to develop a new measure, the Burden of Infertility and Treatment (BIT) scale (Hammarberg et al., 2005). It comprises seven items relating to infertility and its treatment, weighted according to existing evidence about their psychological impact (Table I). The scores for the seven items are added to yield a total BIT score which can range from 4 to 14 where higher scores indicate more difficulties conceiving. Higher maternal age, prolonged infertility and extensive treatment are associated with higher infertility distress (Beaurepaire et al., 1994; Chiba et al., 1997; Greil, 1997; Amir et al., 1999; Nugent and Balen, 2001; Apfel and Kelsey, 2002; Jansen, 2003; Boivin and Schmidt, 2005) and male factor infertility is associated with more distress in both women and men than other types of infertility (Connelly et al., 1987; Mikulincer et al., 1998; Newton et al., 1999). Pregnancy loss is known to increase anxiety in subsequent pregnancies (Statham and Green, 1994; Janssen et al., 1996; Sitzinger et al., 1999; Atthey and Spielvogel, 2000; Brier, 2004) and a previous live birth is thought to reduce distress in this context (Callan and Hennessey, 1988; Newton et al., 1990, 1999). Finally, the use of donor gametes to conceive adds psychological complexities to ART conception (Sheffield, 1997; Boivin and Kentenich, 2002; The American Society for Reproductive Medicine, 2004).

Procedures

Infertility history and the extent and outcome of participants’ ART treatment were ascertained from examination of medical records. In early pregnancy, participants completed a structured telephone interview to ascertain current sociodemographic circumstances and then in the first and third trimesters of pregnancy and 3, 8 and 18 months after the birth they completed postal questionnaires. Data gathered from medical records, telephone interviews, the 3 months post-partum questionnaire and, where relevant, pregnancy questionnaires are reported here.

Data management and analysis

Data were analysed in SPSS v11.5. Frequencies and proportions were used to describe the range of categorical responses to study-specific questions. Data from responses to study-specific questions with ordinal response alternatives were reduced by dichotomising into equal sized groups. Univariate comparisons were made by Student t-test and χ² statistics and

<table>
<thead>
<tr>
<th>Table I Factors and their weighting for the BIT scale</th>
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</thead>
<tbody>
<tr>
<td><strong>Factor</strong></td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Time infertile</td>
</tr>
<tr>
<td>Number of embryo transfers</td>
</tr>
<tr>
<td>Cause of infertility</td>
</tr>
<tr>
<td>Previous pregnancy loss</td>
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<tr>
<td>First time mother</td>
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<tr>
<td>Using donor gametes</td>
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</table>

BIT, burden of infertility and treatment scale.
Pearson’s correlation was used to test for associations between continuous variables. To identify factors that contributed to the outcome variables of interest (admission to REPSs, post-natal mood and maternal confidence), a two-stage statistical procedure was carried out. First, variables which were associated with these outcomes were identified using univariate tests. Second, to ascertain predictors of admission to REPSs lower mood and diminished maternal confidence, regression analyses were carried out using factors that in univariate analyses showed significant association with these outcomes and factors that on theoretical grounds were thought to influence them. Statistical significance was set at $P < 0.05$.

**Results**

**Participant characteristics**

Recruitment rate and participant characteristics have been described elsewhere (Fisher et al., 2007; Hammarberg et al., 2008a). In short, 183/239 (77%) women in the original cohort agreed to participate in the study. There were no differences in the extent and outcomes of ART treatment between those who agreed to take part in the study and those who declined. Four women miscarried between 8 and 18 weeks gestation and two experienced fetal death in utero at $>20$ weeks gestation. Of the remaining 177 women, 166 (94%) completed the first post-partum questionnaire. The cohort was representative of Australian women who gave birth after ART in 2002 in terms of their age, cause of infertility, parity and obstetric outcomes (Bryant et al., 2004). Compared with other childbirth women in Victoria, participants were more likely to have been born in Australia or New Zealand and to be partnered. They were also socio-economically advantaged compared with other Australian women of similar age, in having tertiary qualifications, professional employment and private health insurance, and to be purchasing rather than renting their homes (Hammarberg et al., 2008a). Their babies were on average $3.4 (±0.78)$ months old when the mothers completed the first post-partum assessment.

**Infertility and treatment**

The mean (SD) BIT score for participants was $7.37 (±1.39$, range 4–12) and scores were normally distributed.

**Birth outcomes**

Compared with other women who gave birth in Victoria in 2002, participants were on average 5 years older when they gave birth (35 versus 30 years, $P < 0.0001$), more likely to be first-time mothers (70 versus 42%, $P < 0.0001$), have twins (18 versus 1.6%, $P < 0.0001$), have a Caesarean birth (51 versus 25%, $P < 0.0001$), and have a baby weighing $<2500$ g (15 versus 7%, $P < 0.0001$) (Riley and King, 2003). Of the 196 babies born, 136 (69%) were singletons and 60 (31%) twins.

**Use of early parenting services**

In the first 3 months after giving birth, 40% (66/166) of participants used one or more early parenting services. Most (52/166, 31.5%) attended a day-stay service. However, 13/166 (8%) had been admitted with their baby to a REPS and one woman was admitted to a psychiatric unit. Although the difference was not statistically significant, by 3 months post-partum the ART group had already reached a higher proportion of admissions (8%) than women in the general population of Victoria in the whole of the first post-partum year (5%). Directly comparable data are not available but a recent audit of admissions to a REPS in Victoria showed that fewer than 20% of babies admitted were under the age of 12 weeks (unpublished data). Participants mothering first babies were significantly more likely than multiparous women to access day-stay early parenting services (38 versus 16%, $P = 0.005$), but similar proportions of primiparous and multiparous participants were admitted to REPSs (111/116, 9.5% versus 3/50, 6%, $P = 0.46$).

**Personality, intimate partner relationship and mood**

Scores and comparison data for the measures of personality (VPSQ, Vulnerability), perception of the quality of the intimate partner relationship (IBM Care and Control) and mood (POMS and EPDS) are shown in Table II. The mean total VPSQ score was higher for participants than the scale norms for females suggesting they were more worried and sensitive and less assertive, but IBM scores indicated that they perceived their intimate partners as more sensitive, warm and caring and less dominating, intrusive and authoritarian than the female normative group (Wilhelm and Parker, 1988).

The total POMS score was higher, indicating more distress, than in the comparison data (Hayes et al., 2001), but only 6% of participants had Total Mood scores in the clinical range (>72). In late pregnancy, the proportion of participants scoring $>12$ on the EPDS, indicating probable depression, was significantly lower than in a community cohort of pregnant women (4.2 versus 15.2%, $P < 0.0001$) (Fisher et al., 2007). However, this was not sustained and by 3 months post-partum, the proportions scoring $>12$ were similar (8.4 versus 8%) (Thompson et al., 2000).

Matthey (2004) has demonstrated that a change in EPDS scores of at least four points in either direction is clinically significant. Using this as an indication of clinically relevant mood change from late pregnancy to three months after birth, 58% (92/160) of participants had no change, 26% (42/160) felt better (post-partum EPDS score at least four points lower than late pregnancy score) and 16% (26/160) felt worse (post-partum EPDS score at least four points higher than late pregnancy score). Comparisons between participants who felt worse and those who experienced improvement or no change in mood revealed no significant differences in POMS Tension-Anxiety score in late pregnancy, maternal age, IBM scores, BIT scores, or in proportions having a first baby, having twins, having a Caesarean delivery, feeling disappointed with the birth experience, needing a lot of feeding advice in hospital, being dissatisfied with the length of hospital stay after childbirth, or being anxious about caring for the baby when leaving the hospital. However, participants who experienced significant deterioration in mood from pregnancy to post-partum had a more vulnerable personality (VPSQ score 16.3 versus 14.2, $P = 0.02$) and infants who were more difficult to manage (GI manageability score 2.79 versus 1.96, $P < 0.0001$). They were also less likely to have initiated breastfeeding (79 versus 93%, $P = 0.04$) or to feel ‘very confident’ about caring for the baby at 3 months (31 versus 61%, $P = 0.04$), and more likely to have at least one persistent physical health problem (96 versus 75%, $P = 0.02$), not have enough help with domestic and infant care work (42 versus 13%, $P < 0.0001$),
fewer participants were fully or partly breastfeeding their infants at 3 months (45 versus 62% \(, \text{Donath and Amir, 2000}\) vs. the 1995 Australian National Health Survey). Infants exclusively at 3 months were smaller than among women in this study and mothers of singletons. There were no differences in self-rated confidence between mothers of twins and those of singletons, but not between first-time mothers (52 versus 50%, \(P = 0.06\)) and to be experiencing infant feeding difficulties (58 versus 56%, \(P = 0.06\)).

### Caring for the baby

Women were asked to rate their confidence in caring for their baby when they left the hospital and at the time of completing the questionnaire. Although the proportion feeling ‘very confident’ increased from 27% soon after birth to 56% at three months, 44% still reported feeling only ‘fairly confident’ or ‘occasionally anxious’ at 3 months but no one stated that they felt ‘very anxious’. First-time mothers were significantly more likely than women with previous mothering experience to feel less than ‘very confident’ about caring for the baby at 3 months (51 versus 28%, \(P = 0.06\)) but there were no differences in self-rated confidence between mothers of twins and mothers of singletons.

Almost one third of participants either did not initiate breastfeeding or breastfed for less than 6 weeks. The proportion breastfeeding their infants exclusively at 3 months were smaller than among women in the 1995 Australian National Health Survey (Donath and Amir, 2000) (45 versus 62%, \(P < 0.0001\)). Also, compared with women who participated in the Victorian Survey of Recent Mothers (Brown et al., 2001), fewer participants were fully or partly breastfeeding their infants at 3 months (64 versus 72%, \(P = 0.02\)). Although most women (122/166, 74%) agreed that infant feeding was progressing very well, 67/166 (40%) reported one or more feeding difficulties with the most common problem being low supply of breast milk (25/67, 37%).

The health and development of almost all babies (186/196, 95%) was rated as ‘excellent’ or ‘very good’. Scores on the Early Infant Temperament Questionnaire indicated that participants perceived their infants as having significantly more dysregulated sleeping and feeding behaviours than the normative sample (3.11 versus 2.90 on the ‘Rhythmicity’ subscale, \(P < 0.0001\)). In spite of this, they were more likely to rate their infant as easier (67 versus 56%, \(P = 0.04\)) and less likely to rate them as more difficult to manage (0.5 versus 5%, \(P < 0.001\)) than babies on the GI of infant manageable.

### Determinants of REPS admission, maternal mood and confidence

In univariate analyses, there were no associations between the three outcomes of interest (admission to REPS, mean EPDS scores and self-reported maternal confidence) and the woman’s age, socioeconomic circumstances, mode of delivery or multiple birth. To identify predictors of admission to REPS, a logistic regression analysis was carried out with variables that in univariate analyses showed significant association with admission and those that had a theoretical basis, informed by previous research literature, were thought to contribute to early parenting difficulties and that preceded the admission (Table III). These explained 27% of the admissions (\(R^2 = 0.27\)) and only EPDS score in late pregnancy and infant manageability made significant independent contributions.

Variables associated with mood, as measured by the EPDS scores, and those that on theoretical grounds were thought to influence mood were entered into a general linear regression model (Table IV). Together these variables explained 50% of the variance in EPDS scores (\(R^2 = 0.50\)). Being sensitive, worried or not assertive or having had more depressive symptoms in late pregnancy were pre-existing factors that increased the risk of lower post-natal mood. Having health problems, not getting enough help with domestic and infant care work, feeling lonely, experiencing a concurrent distressing life event, or perceiving the baby as difficult to manage were current factors that contributed significantly to a more depressed mood.

For analysis of maternal confidence, a logistic regression model was fitted with maternal confidence dichotomized into ‘Very confident’ and ‘Fairly confident/Occasionally anxious’ as the outcome variable (Table V). The variables included in the model accounted for 49%
ment to acknowledge any ambivalence about motherhood or to seek help and support. Other people might underestimate their needs and actually provide less support than that given to women who conceive spontaneously and who feel freer to acknowledge the difficulties inherent in mothering a newborn.

Some of the established risk factors for depressed mood after childbirth, which include being young, un-partnered, of low socioeconomic status, of high parity, having an unwanted pregnancy and experiencing marital conflict (Righetti-Veltema et al., 1998; Johanson et al., 2000) are either absent or very rare in ART populations. It has been expected that rates of post-natal mood disturbance would therefore be lower after ART than after spontaneous conception. However, we found that the rate in this group was actually the same as that found in community samples of new mothers. Rates of depression are commonly found to be higher in pregnancy than after birth in community cohorts (Johanson et al., 2000; Evans et al., 2001). However, in this study the pattern of mood change was in the opposite direction. This, coupled

### Table III Explanatory factors for admission to REPS

<table>
<thead>
<tr>
<th>Factor</th>
<th>OR</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mood in late pregnancy (EPDS score)</td>
<td>1.27</td>
<td>0.99–1.62</td>
<td>0.05</td>
</tr>
<tr>
<td>Anxiety in late pregnancy (POMS Tension-Anxiety score)</td>
<td>0.94</td>
<td>0.80–1.10</td>
<td>0.45</td>
</tr>
<tr>
<td>Quality of the relationship with the partner in late pregnancy (IBM Care score)</td>
<td>0.98</td>
<td>0.88–1.01</td>
<td>0.72</td>
</tr>
<tr>
<td>Vulnerable personality style (VPSQ score)</td>
<td>1.17</td>
<td>0.96–1.41</td>
<td>0.12</td>
</tr>
<tr>
<td>Burden of infertility and treatment (BIT score)</td>
<td>1.31</td>
<td>0.78–2.22</td>
<td>0.31</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiparous</td>
<td>0.90</td>
<td>0.16–3.28</td>
<td>0.67</td>
</tr>
<tr>
<td>Multiplicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Singleton</td>
<td>0.90</td>
<td>0.18–4.41</td>
<td>0.90</td>
</tr>
<tr>
<td>Mode of delivery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal</td>
<td>0.99</td>
<td>0.26–3.74</td>
<td>0.98</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>2.28</td>
<td>1.01–5.16</td>
<td>0.05</td>
</tr>
</tbody>
</table>

EPDS, Edinburgh post-natal depression scale; IBM, intimate bonds measure; POMS, profile of mood states; VPSQ, vulnerable personality style questionnaire.

### Table IV Explanatory factors for mood three months post-partum (EPDS score)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Standardized coefficients</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feel about length of hospital stay after birth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>About right</td>
<td></td>
<td>−0.64 to 1.65</td>
<td>0.38</td>
</tr>
<tr>
<td>Too long/too short</td>
<td>0.053</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current health problems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No health problems</td>
<td></td>
<td>0.09–2.52</td>
<td>0.04</td>
</tr>
<tr>
<td>One or more health problems</td>
<td>0.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getting enough help with domestic and infant care work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>0.12–2.90</td>
<td>0.03</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeling lonely</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occasionally/rarely</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sometimes/often</td>
<td>0.21</td>
<td>1.02–3.96</td>
<td>0.001</td>
</tr>
<tr>
<td>Experiencing a concurrent distressing life event</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>0.59–2.71</td>
<td>0.003</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mood in late pregnancy (EPDS score)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of the relationship with partner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IBM care score</td>
<td>−0.06</td>
<td>−0.13 to 0.04</td>
<td>0.36</td>
</tr>
<tr>
<td>IBM control score</td>
<td>−0.11</td>
<td>−0.22 to 0.02</td>
<td>0.09</td>
</tr>
<tr>
<td>Vulnerable personality style (VPSQ score)</td>
<td>0.24</td>
<td>0.13–0.40</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Infant manageability (EITQ GI score)</td>
<td>0.18</td>
<td>0.25–1.39</td>
<td>0.005</td>
</tr>
</tbody>
</table>

EPDS, Edinburgh post-natal depression scale; EITQ, early infancy temperament questionnaire; IBM, intimate bonds measure; VPSQ, vulnerable personality style questionnaire.

(R² 0.49) of the variance in maternal confidence. Predictors of lower maternal confidence were being less satisfied with intrapartum care or more anxious about baby care when leaving the hospital, feeling lonely, having a more sensitive, anxious and non-assertive personality, perceiving the baby as more difficult to manage, or having experienced more difficulties in conceiving (higher BIT score).

### Discussion

The aim of this study was to understand better the experience of early parenting after assisted conception. The data demonstrate that in a proportion of women who conceive with ART, mood declines significantly from pregnancy to post-partum, that breastfeeding rates at 3 months post-partum are lower after ART than after spontaneous conception and that infertility and its treatment erodes maternal confidence. They also confirm our previous findings that rates of admission to REPSs are significantly higher in women who have conceived with ART than those who have conceived spontaneously.

A possible explanation for this is that the adverse psychological effects of infertility, the need for technology to conceive, intense surveillance during pregnancy and operative birth are cumulative and erode women’s confidence in themselves and their ability to care for their new baby. The particular characteristics of women who become mothers after ART such as being older when giving birth, and having a higher risk than other women of multiple birth, Caesarean birth, disappointment with the birth experience and anxiety about taking the baby home from hospital may also contribute (Hammarberg et al., 2008a). As they have become mothers after considerable efforts and feel fortunate that ART was successful, women may also have a low sense of entitlement to acknowledge any ambivalence about motherhood or to seek help and support. Other people might underestimate their needs and actually provide less support than that given to women who conceive spontaneously and who feel freer to acknowledge the difficulties inherent in mothering a newborn.
with the loneliness, lower than needed support, and difficulty in managing infant crying, sleeping and feeding that were associated with postnatal mood suggest that women may have idealized expectations of mothering after ART conception and be unprepared for the social isolation and relentless work involved in caring for a newborn. A number of factors are associated with a higher rate of initiation and longer duration of breastfeeding including maternal age over 25, higher level of education, being partnered and having higher socioeconomic status (Scott and Binns, 1998). Most of the participants in this study had these characteristics, but despite these, the rate of initiation of breastfeeding was not higher and the proportion breastfeeding at 3 months was significantly lower than among the general population of childbearing women. Almost a third of participants either did not initiate breastfeeding or breastfed for <6 weeks. It is possible that the infertility experience reduces confidence in their personal capacity to sustain a baby and elevated anxiety about the adequacy of the milk supply may have prevented some mothers from initiating or continuing breastfeeding beyond 6 weeks. This study suggests that maternal confidence is compromised by infertility and ART. This supports the finding by McMahon et al. (1997) that 4 months after birth women who had conceived with ART had lower self-esteem and maternal confidence than a comparison group who had conceived without difficulty. In that study, the group difference was mainly accounted for by those who had had more than one ART cycle, which suggests that failed ART corrodes self-esteem and self-confidence. The independent negative effect on maternal confidence of greater difficulty involved in conceiving, as measured by the BIT, that we found, provides further evidence that there is a relationship between fertility difficulties and reduced early maternal confidence.

According to Hiscock and Jordan (2004) anxious and overprotective parenting where the baby is handled frequently and not left to self-settle may be more common after infertility treatment and contribute to sleeping and feeding problems in early infancy. Diminished confidence about caring for the baby and anxiety about the baby’s welfare may be legacies of the experiences of infertility and infertility treatment which lead to hypervigilance, and over attentive mothering. This may in part explain the high rate of utilization of early parenting services among women in this study. For health care professionals who care for childbearing women, it is important to be aware that women who conceive with ART and experience deterioration in mood from late pregnancy to early post-partum are three times more likely than those who experience improvement or no change in mood to be admitted to a REPS.

This study has considerable strengths compared with previous investigations in the field. The prospective longitudinal design, recruitment of a large consecutive cohort, minimal exclusion criteria, and high response and retention rates are methodological strengths that indicate that the findings can be generalized with confidence. The study also has limitations. Its findings cannot be presumed to reflect the experiences of women who do not speak English and it is acknowledged that there may have been psychological differences between women who declined participation and those who agreed to participate even if they did not differ on available treatment data. It would have been relevant to assess past history of psychiatric illness and to measure self esteem, but these were not done. We believe that the inherent difficulties in finding an accurately matched comparison group for the sociodemographically and gynaecologically heterogeneous group of women who conceive with ART justifies using population based data and scale norms as comparison but acknowledge that this may limit the interpretation of our findings. It is acknowledged that population based comparison data are not exactly contemporaneous, represent greater diversity in all dimensions, and are therefore imperfect. However, comparison groups in previous studies have differed in ways likely to influence psychosocial outcomes including maternal age, duration of partner relationship, socioeconomic position, and length of time to conceive (Hammarberg et al., 2008b). We believe that the use of population based comparison groups is more appropriate than highly selected comparison samples.

The findings of this study are important for clinical practice as they improve our understanding of psychological adjustment to motherhood of the growing group of women who conceive with ART. Health care professionals who care for pregnant women and mothers should not presume that mothering is less complex or difficult for women who conceive with ART than for those who conceive spontaneously. Further, women who conceive with ART are extremely grateful that the treatment has allowed them to have a baby and may be reluctant to complain or express ambivalent feelings about motherhood. However, caring for a newborn is just as demanding and challenging for them as for women who have conceived spontaneously. Self-confidence, in particular a reduced confidence in their capacity to mother, and inhibition about acknowledging and addressing the inevitable losses associated with the birth of a baby may increase vulnerability to distress in women in the first few months after the birth.
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References


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