The impact of IVF/ICSI on parental well-being and anxiety 1 year after childbirth

M. Jongbloed-Pereboom1,5, K.J. Middelburg1,6, M.J. Heineman2,6, A.F. Bos3, M.L. Haadsma4, and M. Hadders-Algra1,*

1Division of Developmental Neurology, Department of Paediatrics, University Medical Center Groningen, Hanzeplein 1, 9713 GZ, Groningen, The Netherlands 2Department of Obstetrics and Gynaecology, University Medical Center Groningen, Hanzeplein 1, 9713 GZ, Groningen, The Netherlands 3Division of Neonatology, Department of Paediatrics, University Medical Center Groningen, Hanzeplein 1, 9713 GZ, Groningen, The Netherlands 4Department of Genetics, University Medical Center Groningen, Hanzeplein 1, 9713 GZ, Groningen, The Netherlands 5Present address: Behavioural Science Institute, University of Nijmegen, Montessorilaan 3, 6525 HR Nijmegen, The Netherlands 6Present address: Department of Obstetrics and Gynaecology, Academic Medical Center, Meibergdreef 9, 1105 AZ Amsterdam, The Netherlands

*Correspondence address. Tel: +31 50 3614247; Fax: +31 50 3619158; E-mail: m.hadders-algra@umcg.nl

Submitted on July 2, 2011; resubmitted on March 26, 2012; accepted on April 10, 2012

BACKGROUND: More couples are delaying childbirth resulting in an increase in age-related subfertility in women. Subfertility and assisted reproductive technology (ART) treatments may affect couples’ psychological well-being. The aim of the present study was to investigate whether factors related to IVF/ICSI affect anxiety and mental health in couples 1 year after childbirth.

METHOD: In this cohort study, we included couples with a singleton pregnancy following IVF/ICSI treatment (n = 113) and subfertile couples who naturally conceived (NC; n = 83). Parental trait anxiety (Dutch version of the Spielberger State-Trait Anxiety Inventory) and mental health (Dutch version of General Health Questionnaire) were assessed 1 year after childbirth. The influence of fertility-related factors was analyzed with logistic regression analyses.

RESULTS: One hundred and ninety-six couples participated, 93% of those eligible. Trait anxiety and mental health were similar in IVF/ICSI and NC groups. However, NC fathers had more often mental health scores in the clinical range (21%) than fathers in the IVF/ICSI group (9%). The risk of having a trait anxiety or mental health score in the clinical range was reduced by the presence of one of the following factors: for females a higher number of IVF/ICSI treatment cycles, and a maternal cause of subfertility, for males having been treated by IVF/ICSI and a longer time to pregnancy.

CONCLUSIONS: The present study indicates (i) that IVF/ICSI treatment is not associated with an increase in clinically relevant Spielberger State-Trait Anxiety Inventory and General Health Questionnaire scores in parents 1 year after childbirth and (ii) a higher number of IVF/ICSI treatment cycles and a longer time to pregnancy were associated with less trait anxiety and better mental health. A limitation of the study is the absence of mental health and trait anxiety data at baseline.

Key words: IVF / ICSI / well-being / anxiety / subfertility

Introduction

In today’s Western society an increasing number of couples delay the birth of their first child (Baird et al., 2005). In Europe, the mean age for a woman to have her first child has increased 2 years since 1980 and is now 29 years (Commission of the European Communities, 2007). A consequence of this demographic trend is an associated increase in the incidence of age-related subfertility in women, and to a lesser extent, in men (Baird et al., 2005). This is reflected in the greater demand for assisted reproductive technology (ART; Ziebe and Devroey, 2008). In 2006, 0.8–4.1% of children in European countries were born following ART (de Mouzon et al., 2010).

Subfertility and imminent childlessness strongly influence psychological well-being (Greil, 1997). In addition, IVF treatment is an...
emotional and physically stressful process (Verhaak et al., 2007). Couples who conceive with the help of ART often have experienced a long period of uncertainty and sometimes physically painful technical procedures before reaching pregnancy. Moreover, pregnancies obtained with ART present with a higher risk of medical complications and children born after ART have a higher risk of being born preterm or with low birthweight (Helmerhorst et al., 2004; Jackson et al., 2004). Very low birthweight of the infant is associated with an increase in maternal psychological distress (Singer et al., 1999). To complicate things further, a recent meta-analysis of Matthiesen et al. (2004) demonstrated small but significant associations between stress and anxiety and a reduced chance of pregnancy in women who try to conceive with ART.

The above indicates that couples who conceive with ART are at risk for increased psychological distress and reduced parental well-being. Hammarberg et al. (2008) addressed this issue in a systematic review. They concluded that there is only a moderate body of research on psychological and social consequences of pregnancy, childbirth and early parenting after ART. The review indicated that women who conceive with ART in general do not show reduced well-being or increased anxiety. But several studies using qualitative interviews revealed that these women show more specific anxieties related to their pregnancy (Hammarberg et al., 2008). Knowledge about parental well-being after birth of an ART-conceived child is limited. In addition, little is known about the impact of several specific reproductive history-related characteristics, like fertility diagnosis, duration of infertility and extent of treatment on parental well-being after childbirth. The large majority of studies addressing the association between ART and parental well-being dealt with maternal well-being only; therefore information on paternal well-being is scarce (Hammarberg et al., 2008). The few studies on well-being of men who became fathers after ART provided conflicting results. Cohen et al. (2001) reported that IVF-fathers were more anxious and had a lower self-esteem after child birth than control fathers. However, Vilska et al. (2009) did not report differences in well-being during pregnancy, 2 months, and 1 year after childbirth in men conceiving with or without IVF/ICSI. Two other studies concluded that well-being of fathers was not reduced one or 5 years after childbirth (Gibson et al., 2000; McMahon et al., 2003).

Altogether, the literature suggests that mental health and anxiety in couples conceiving with ART is similar to that of couples conceiving without ART, but the evidence that this is true is of only moderate quality. Therefore, in the present study, we investigated whether IVF/ICSI itself and factors related to IVF/ICSI affect mental health and anxiety in women and men 1 year after childbirth. We compared subfertile couples who conceived with IVF/ICSI with couples who conceived naturally, while waiting for fertility evaluation or treatment. In the total study group, we studied the effect of time to pregnancy, male- or female-factor infertility and number of treatment cycles on parental mental health and trait anxiety. We hypothesized (i) that couples who conceived with IVF/ICSI show higher levels of trait anxiety and reduced levels of mental health than subfertile couples who conceived naturally and (ii) that couples who experienced a longer time to pregnancy and a higher number of treatment cycles show higher levels of trait anxiety and reduced levels of mental health.

**Materials and Methods**

**Participants**

From March 2005 to December 2006, all couples with an ongoing pregnancy following IVF or ICSI at the department of reproductive medicine of the University Medical Center Groningen (UMCG) were invited to participate in a study on neurodevelopmental outcome of IVF/ICSI children. Patients were treated either with conventional IVF/ICSI (in the controlled ovarian hyperstimulation-cycle; COH-IVF) or with IVF/ICSI after minimal hormonal stimulation [modified natural cycle (MNC-IVF); Pelinck et al., 2007, 2008]. The distinction between the COH-IVF and MNC-IVF group is not relevant for the present study, therefore we pooled the two groups to form one IVF/ICSI group. The control group consisted of couples who conceived naturally while on the waiting list for fertility evaluation or treatment at the UMCG (naturally conceived, NC). Excluded from this study were couples with pregnancies resulting from any other form of assisted reproduction (e.g. ovulation induction and/or insemination), couples who achieved pregnancy from cryopreserved or donated gametes or embryos and parents of twins. For more details on recruitment and participation, see Middelburg et al. (2010). Two hundred and ten couples were eligible for participation in this study, i.e. 120 couples in the IVF/ICSI group and 90 couples in the NC group.

The study was approved by the ethics committee of the University Medical Center Groningen. Written informed consent was obtained before participation in the study.

**Procedure**

Patient characteristics, socioeconomic conditions, details on pregnancy and the neonatal period were collected by interview within 2 weeks after the expected date of delivery. Details on fertility diagnoses, treatment procedures and time to pregnancy were obtained from medical records. Time to pregnancy was defined as the period between the onset of attempts to conceive or a previous pregnancy (or miscarriage) and the last menstrual period prior to pregnancy. Number of treatment cycles was defined as the number of IVF/ICSI treatments needed to achieve the present ongoing pregnancy. Questionnaires were sent to both parents when the children had reached the age of 1 year.

**Measures**

**Trait anxiety**

Trait anxiety was measured with the Dutch version of the Spielberger State-Trait Anxiety Inventory (STAI; Van der Ploeg et al., 1980). Trait anxiety is a relatively stable attribute of people to perceive situations as threatening and thus react to these situations with increased state anxiety. We used this part of the STAI as we were interested in long-term anxiety conditions. The Trait part of the STAI questionnaire contains 20 items. Each answer was scored on a four-point Likert scale, resulting in a total score of minimally 20 points and maximally 80 points (further denoted as STAI score). High scores represent high-trait anxiety, and low scores represent low-trait anxiety. Within the study group, we considered gender-specific scores above the 80th percentile (in this sample: scores above 34 and 37 for males and females, respectively) as clinically relevant. We chose the 80th percentile as cut-off in analogy to the official cut-off of the General Health Questionnaire. According to Van der Ploeg et al. (1980) the reliability of the STAI was good in a representative sample of the Dutch population (α = 0.95). Crohnbach’s alpha in the present sample was 0.90.
Mental health
Mental health was assessed by the Dutch version of General Health Questionnaire (30 item version; GHQ: Koeter and Ormel, 1991). This questionnaire describes mental well-being of adults. It is a screening tool to detect people at risk for psychiatric disorders. The GHQ measures common mental health problems such as feelings of depression, somatic symptoms and anxiety and furnishes a total score. Each item of the GHQ is scored either as 0 or 1, where 0 denotes the absence of symptoms and 1 their presence. Each item contributes to the total score with a maximum of 30 points. High GHQ scores represent reduced mental health, low GHQ scores represent typical mental health. GHQ scores were dichotomized into clinically relevant (>4) or not, according to the manual (Koeter and Ormel, 1991). According to Koeter and Ormel (1991) the GHQ-30 had a good reliability in a general sample of the Dutch population (α = 0.93). Cronbach’s alpha in present sample was 0.91.

Statistical analysis
Data analysis was performed with the Statistical Package for Social Sciences (SPSS) 17.0 for Windows. Group differences on background characteristics were evaluated by means of Student’s t-test, χ² test, Fisher’s exact test and the Mann–Whitney U-test where applicable.

Group differences on GHQ and STAI scores were tested with the Mann–Whitney U-test, because of non-normally distributed data. Next, univariate statistics (Mann–Whitney U-tests or χ² tests) were applied to assess relationships between the presence of clinically relevant GHQ and STAI scores and demographic variables (parental age, parental ethnicity), socioeconomic variables (parental education, working status), subfertility related variables (IVF/ICSI treatment, time to pregnancy, fertility diagnosis, number of IVF/ICSI treatment cycles), variables concerning pregnancy (nulliparous or parous, smoking and alcohol use during pregnancy, pregnancy complications) and perinatal variables (birthweight, gestational age, gender, low Apgar score, admission to NICU and duration of breastfeeding). Factors associated with the GHQ and/or STAI scores with a P-value of <0.10 were identified as possible confounders and selected for multivariate analysis. Logistic regression analyses were used to parcel out the effect of time to pregnancy, male- and female-factor infertility, ART treatment and the number of treatment cycles on the dichotomized GHQ and STAI scores. Differences with a P-value of <0.05 were considered statistically significant.

Results
In hundred and ninety-six (93%) of 210 eligible couples at least one of the parents returned the questionnaires (questionnaires returned: 113 IVF/ICSI females, 110 IVF/ICSI males, 83 NC females, 82 NC males). In the IVF/ICSI group data of seven couples were missing: four couples gave no reason for not returning the questionnaires, two couples lost interest in the study, and one couple could not be traced after change of address. Also in the NC group the female half of one couple returned the questionnaires, as completion of the questionnaires by the male partner was hampered by workload or a divorce. Finally, for one NC female participant only the STAI could be used, as an excess of missing items precluded inclusion of the GHQ.

Parental, fertility and infant characteristics of the IVF/ICSI- and NC-group are shown in Table I. Parental age and education were similar in the two groups, fertility characteristics were not. In the IVF/ICSI group subfertility was more often due to male factor subfertility [χ²(1) = 15.797, P < 0.001], time to pregnancy was longer [U = 3050.50, z = −4.07, P < 0.001] and—obviously—the number of IVF treatment cycles was higher than in the NC-group (U = 344.50, n = 112). Other cause of subfertility were female factor (includes tubal infection, endometriosis, hormonal disorders, cervical factor), male factor, infertility and status after vasovasostomy. In the NC-group the time to pregnancy was on average longer (8.5) compared to the IVF/ICSI group (7.0). gestation was similar in both groups. Mean birthweight was not significantly different (IVF/ICSI group: 3280 g, NC-group: 3250 g). Table I shows that the number of ART treatment cycles was higher in the IVF/ICSI group. However, after controlling for potential confounders (female and male age, number of female treatments, time to pregnancy) the effect of number of IVF/ICSI treatment cycles on the dichotomized GHQ score was not statistically significant (χ² test, P = 0.13).

Table I Patient, fertility and infant characteristics.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>IVF/ICSI group (n = 113)</th>
<th>NC group (n = 83)</th>
</tr>
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<tbody>
<tr>
<td><strong>Female characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at conception; median (range)</td>
<td>32.7 (25−40)</td>
<td>33.0 (22−40)</td>
</tr>
<tr>
<td>Education level (high); n (%)</td>
<td>38 (34)</td>
<td>38 (46)</td>
</tr>
<tr>
<td>Ethnicity (caucasian); n (%)</td>
<td>109 (97)</td>
<td>79 (95)</td>
</tr>
<tr>
<td>Nulliparous; n (%)</td>
<td>78 (69)</td>
<td>50 (60)</td>
</tr>
<tr>
<td><strong>Male characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at conception; median (range)</td>
<td>34.9 (27−56)</td>
<td>35.4 (25−52)</td>
</tr>
<tr>
<td>Education level (high); n (%)</td>
<td>45 (40)</td>
<td>32 (39)</td>
</tr>
<tr>
<td>Ethnicity (caucasian); n (%)</td>
<td>110 (97)</td>
<td>75 (90)</td>
</tr>
<tr>
<td><strong>Fertility parameters</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cause of subfertilityb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female factor; n (%)</td>
<td>40 (35)</td>
<td>21 (25)</td>
</tr>
<tr>
<td>Male factor; n (%)</td>
<td>65 (58)***</td>
<td>24 (29)</td>
</tr>
<tr>
<td>Time to pregnancy in years; median (range)</td>
<td>3.9 (0.1−13.3)***</td>
<td>2.1 (0.1−11.3)†</td>
</tr>
<tr>
<td>Number of IVF/ICSI treatments</td>
<td>Total; median (range)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 (1−12)***</td>
<td>0 (0−7)</td>
</tr>
<tr>
<td><strong>Infant characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male; n (%)</td>
<td>59 (52)</td>
<td>43 (52)</td>
</tr>
<tr>
<td>Birthweight in grams; mean (SD)</td>
<td>3397 (558)*</td>
<td>3560 (587)</td>
</tr>
<tr>
<td>Gestational age &lt;37 weeks; n (%)</td>
<td>12 (11)</td>
<td>6 (7)</td>
</tr>
<tr>
<td>Breastfeeding (number of weeks); median (range)</td>
<td>4 (0−39)</td>
<td>6 (0−42)</td>
</tr>
</tbody>
</table>

*Significantly different, P < 0.05.
**Significantly different, P ≤ 0.001.
†University education or vocational colleges.
‡Causes of subfertility not determined for 16 couples in the ART group (14%) and for 43 couples in the NC group (52%). Total numbers may exceed 100% (in some cases both male- and female-factor subfertility occurred).
§Female factor subfertility: tube pathology, endometriosis, hormonal disorders, cervical factor and status after tubal surgery or reversal of tubal sterilization.
||Male factor subfertility: andrological subfertility and status after vasovasostomy.
||Time to pregnancy was defined as the period between the onset of attempts to conceive or a previous pregnancy and the last menstrual period prior to pregnancy.
z = –1.148, P < 0.001). Furthermore, the infants in the IVF/ICSI group had a significantly lower birthweight [(t(194) = –1.99, P < 0.05).

The IVF/ICSI and NC group showed similar STAI scores and GHQ scores (Table II). The rate of clinically relevant scores only differed for the male STAI score: NC-men had more often GHQ scores in the clinical range (21%) than men in the IVF/ICSI group [9%; \( \chi^2(1) = 5.150, P < 0.05 \)].

Next, we analyzed the relationship between specific fertility factors and the presence of a clinically relevant STAI score in females. This analysis (the univariate analysis) revealed that the presence of a maternal cause of subfertility and the number of IVF/ICSI treatment cycles were associated with an increased risk of a clinically relevant STAI score \( [\chi^2(1) = 3.942, P < 0.05 \text{ and } U = 2406.50, z = –2.14, P < 0.05, \text{respectively}] \). When entered into the multivariate regression analysis only the association with the number of ART treatment cycles remained statistically significant [OR 0.79, 95% CI (0.64–0.97), Table III]. Interestingly, the direction of the association indicated that more treatment cycles were associated with a higher chance of females having STAI scores within the normal range. Breastfeeding [OR 0.96, 95% CI (0.92–1.00)] and ethnicity of the partner [OR 3.563, 95% CI (0.96–13.16)] also contributed to a minor- and statistically insignificant extent to the women’s trait anxiety score. Breastfeeding was associated with a higher chance of females to have a STAI score within the normal range, having a non-Caucasian partner was associated with a higher chance for women to have clinically relevant STAI scores.

Univariate analysis indicated that clinically relevant female GHQ scores were associated with a maternal cause of subfertility \( [\chi^2(1) = 4.975, P < 0.05] \) and less significantly with the number of ART treatment cycles \( (U = 2839.50, z = –1.67, P < 0.1) \). When adjusting for confounding factors, only the association between clinically relevant female GHQ scores and maternal cause of subfertility remained statistically significant [OR 0.33, 95% CI (0.13–0.83)]. This meant that the presence of a maternal cause of subfertility was associated with a higher chance for females to fall within the normal range of well-being. Again, breastfeeding [OR 0.95, 95% CI (0.91–0.99)] and ethnicity of the partner [OR 9.73, 95% CI (2.42–39.06)] contributed to some extent to well-being. Breastfeeding was associated with a higher chance of females having a GHQ score within the normal range; the presence of a non-Caucasian partner was associated with a higher chance for women to have clinically relevant GHQ scores.

In the univariate analysis clinically relevant male STAI scores were associated with time to pregnancy \( (Z = 2451.00, z = –1.95, P < 0.1) \), indicating that a longer time to pregnancy was associated with a higher chance for males to have STAI scores within the normal range. The multivariate analysis confirmed this association [OR 0.80, 95% CI (0.66–0.99)].

IVF/ICSI treatment was related to clinically relevant GHQ scores in men \( [\chi^2(1) = 4.975, P < 0.05] \), an association that remained statistically significant in the multivariate analysis [OR 2.65, 95% CI

### Table II Descriptive statistics for outcome variables.

<table>
<thead>
<tr>
<th></th>
<th>IVF/ICSI group (n = 113)</th>
<th>NC group (n = 83)</th>
<th></th>
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<tbody>
<tr>
<td>STAI trait anxiety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female; median (range)</td>
<td>30 (20–56)</td>
<td>32 (22–67)</td>
<td></td>
</tr>
<tr>
<td>Female STAI score ≥ 38; n (%)</td>
<td>20 (18)</td>
<td>19 (23)</td>
<td></td>
</tr>
<tr>
<td>Male; median (range)a</td>
<td>28 (20–55)</td>
<td>28 (20–55)</td>
<td></td>
</tr>
<tr>
<td>Male STAI score ≥ 35; n (%)</td>
<td>20 (18)</td>
<td>15 (18)</td>
<td></td>
</tr>
<tr>
<td>GHQ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female; median (range)b</td>
<td>1 (0–20)</td>
<td>1 (0–27)</td>
<td></td>
</tr>
<tr>
<td>Female GHQ score ≥ 5; n (%)</td>
<td>24 (21)</td>
<td>22 (27)</td>
<td></td>
</tr>
<tr>
<td>Male; median (range)c</td>
<td>1 (0–13)</td>
<td>1 (0–22)</td>
<td></td>
</tr>
<tr>
<td>Male GHQ score ≥ 5; n (%)d</td>
<td>10 (9)</td>
<td>21 (21)</td>
<td></td>
</tr>
</tbody>
</table>

\( a \) Represent clinical relevant score (respectively above the 80th percentile).
\( b \) Missing values IVF/ICSI: n = 3, NC: n = 1.
\( c \) Missing value IVF/ICSI: n = 1.
\( d \) Missing value IVF/ICSI: n = 4, NC: n = 1.

### Table III Logistic regression analysis: association between fertility-related factors and STAI and GHQ scores.

<table>
<thead>
<tr>
<th></th>
<th>STAI female ≤ 37</th>
<th>STAI female ≥ 38*</th>
<th>Odds's ratio (95% CI)</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of IVF/ICSI treatments; median (range)</td>
<td>1 (0–12)</td>
<td>1 (0–6)</td>
<td>0.79 [0.64–0.97] (per treatment)b</td>
<td>0.12</td>
</tr>
<tr>
<td>Time to pregnancy (in years); median (range)</td>
<td>3.4 (0.1–13.0)</td>
<td>2.3 (0.5–6.0)</td>
<td>0.80 [0.66–0.99] (per year)</td>
<td>0.12</td>
</tr>
<tr>
<td>No female cause of subfertility; n (%)</td>
<td>96 (71)</td>
<td>39 (29)</td>
<td>1 (Ref)</td>
<td>0.14</td>
</tr>
<tr>
<td>Female cause of subfertility; n (%)</td>
<td>53 (88)</td>
<td>7 (12)</td>
<td>0.33 [0.13–0.83]c</td>
<td></td>
</tr>
<tr>
<td>GHQ female ≤ 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GHQ female ≥ 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IVF/ICSI treatment n (%)</td>
<td>104 (90)</td>
<td>11 (10)</td>
<td>1 (Ref)</td>
<td>0.15</td>
</tr>
<tr>
<td>No IVF/ICSI treatment n (%)</td>
<td>60 (79)</td>
<td>16 (21)</td>
<td>2.65 [1.14–6.16]c</td>
<td></td>
</tr>
</tbody>
</table>

\( a \) Represent clinical relevant score (respectively above the 80th percentile).
\( b \) Adjusted for number of weeks breastfeeding and partners’ ethnicity.
\( c \) Adjusted for level of education.
The association suggests that exposure to IVF/ICSI treatment—indeed the number of treatment cycles—was associated with a higher chance for men to have a well-being within the normal range. Male GHQ scores were also related to level of education [OR 0.42, 95% CI (0.18–0.98)]. A high level of education was associated with a higher chance of men having clinically relevant STAI or GHQ scores.

**Discussion**

This study indicated that IVF/ICSI treatment and factors related to IVF/ICSI treatment were associated with relatively good parental mental health and trait anxiety scores 1 year after childbirth. Having been treated by IVF/ICSI, a higher number of IVF/ICSI treatment cycles, a maternal cause of subfertility and a longer time to pregnancy were associated with lower risk for trait anxiety and reduced mental health.

The findings imply that our hypotheses, i.e. IVF/ICSI treatment, longer time to pregnancy and a higher number of treatment cycles are associated with increased parental trait anxiety and reduced mental well-being of parents, were rejected. Three possible mechanisms may underlie the positive associations between IVF/ICSI treatment and fertility-related factors and psychological well-being. First, the associations may be caused by self-selection, i.e. couples in good mental condition most likely are able to cope better with a long and stressful period of IVF/ICSI treatment than couples with a more vulnerable mental condition. Repokari et al. (2005) found that couples who have been exposed to several treatment cycles and have a successful outcome, are more resilient than couples who conceive naturally. Furthermore, couples who have been exposed to several treatment cycles are able to sustain with treatment compared with couples who do not start treatment or discontinue IVF treatment (Edelmann et al., 1994; Olivius et al., 2004). The finding of others that ART treatment is associated with a positive influence on marital relationship may be an expression of similar mechanisms of self-selection (Hammarberg et al., 2001; Schmidt et al., 2005). Secondly, the positive influence on mental health and trait anxiety may be biased, as being grateful for having a child may hinder the expression of feelings of anxiety and stress. Support for this suggestion was provided by Ulrich et al. (2004) who reported that women who had a child after IVF were less communicative and expressed feelings and fears less than women who conceived naturally. Thirdly, the joy of finally having a child after a long and intense period of fertility treatment may cause overwhelming happiness. This mechanism may also underlie the association between female factor infertility and a decreased risk of clinically relevant GHQ scores in the present study. An additional explanation for the association between the presence of a maternal cause of subfertility and a higher chance of having mental well-being within the normal range may be offered. Berg and Wilson (1991) reported that both women and men show increased psychological well-being 2 years after fertility evaluation and diagnosis. It is conceivable that women who first suffered from infertility, generate extra positive feelings when their body functions properly during pregnancy and childbirth.

Our data indicated that also the duration of breastfeeding and the partner’s ethnicity showed an association with female STAI and GHQ scores. Longer duration of breastfeeding was associated with less clinically relevant STAI and GHQ scores. These results are supported by a recent study which showed that breastfeeding duration after ART was shorter if anxiety levels in late pregnancy were higher (Hammarberg et al., 2011). The association between breastfeeding and mental health is well known, although the direction of the association is not clear. If breastfeeding results in better maternal mental health both the mental predisposition to choose to breastfeed the infant and the circumstances related to breastfeeding may contribute (Mezzacappa and Katkin, 2002). Women who had a non-Caucasian partner more often had a clinically relevant GHQ score. This finding may be related to the higher levels of depressive and anxiety disorders in people with a non-Caucasian background in the Netherlands, in particular Turkish and Moroccan people (Bengi-Arslan et al., 2002; de Wit et al., 2008). Our data suggested that the partner’s non-Caucasian background and not the woman’s own ethnic background was associated with some extent with non-optimal health and anxiety; this reflects that gender roles may vary across cultural settings (Costa et al., 2001). However, caution is warranted not to over interpret this finding as the number of non-Caucasian partners is small (n = 11).

So far, few other studies reported on well-being of men who became fathers after ART. One study reported that IVF-fathers were more anxious and had lower self-esteem after child birth than control fathers (Cohen et al., 2001). Three studies described that psychological well-being of fathers conceived with IVF/ICSI was similar to that of control fathers (Gibson et al., 2000; McMahon et al., 2003; Vilska et al., 2009). These four studies compared paternal well-being after conception with IVF/ICSI with that after natural conception in fertile couples. Our findings take into account the effect of subfertility, and the results suggest a minor positive effect of IVF/ICSI and factors related to IVF/ICSI treatment.

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Our study indicates that trait anxiety and mental well-being, as measured with questionnaires, are not affected 1 year after childbirth in couples who conceived with IVF/ICSI. Based on the results of self-reported mental health, prevention and intervention regarding mental health and anxiety in couples who conceive with IVF/ICSI do not seem necessary. However, it should be realized that limited longitudinal data on mental health and anxiety are available; this is especially true for men conceiving with ART. Future research should include measurements of mental health and anxiety at several time points, preferably before, during, and after pregnancy and during childhood. Additional insight into mental well-being could be obtained by using different instruments, such as interviews and psychological testing.

A strength of our study is that we investigated mental health and trait anxiety of both women and men. Therefore, this study contributes to the limited amount of research about mental health of men experiencing infertility and successful treatment outcome. Another strength of the study is the inclusion of subfertile couples who conceived naturally or with IVF/ICSI treatment, allowing for the elucidation of the effect on mental health of IVF/ICSI treatment per se, while composing a control group which resembles the IVF/ICSI group in demographic characteristics and the presence of subfertility. The latter may have a large impact on well-being (Greil, 1997). Third, in this study fertility characteristics were well documented. This allowed for the evaluation of the contribution of these characteristics to parental mental health and trait anxiety.

However, the study also has limitations. First, the results are based on self-reported mental health. Self reports may be vulnerable to
social desirability. Moreover, couples undergoing ART, may feel that they have to be happy and well after successful treatment as was suggested by Repokari et al. (2005). Secondly, about 70% of eligible couples decided in the third trimester of pregnancy to participate in the follow-up study. Previously we reported however, that participation was non-selective for relevant social and biological risk factors (Middelburg et al., 2010). Yet, it is conceivable that couples who declined from participation in the study may have shown more clinically relevant outcomes on GHQ and STAI than participating couples. Nonetheless, further attrition after child birth was low. Thirdly, we chose to measure mental health and trait anxiety in couples 1 year after childbirth, considering that this is a point in time when couples have adjusted to their new family composition. The timing however carries the disadvantage of a long time interval between fertility problems and IVF/ICSI treatment and outcome measurement; time may have resulted in a resolution of a temporarily reduction of well-being related to subfertility and subfertility treatment. Therefore, it would have been more informative if data on mental health also had been collected before the start of treatment or referral to the center of reproductive medicine, during pregnancy and shortly after childbirth.

Conclusion

The present study indicates that conceiving with IVF/ICSI treatment is not associated with an increased risk of clinically relevant STAI and GHQ scores in mothers and fathers 1 year after childbirth. The findings rather point to an association in an opposite direction: a higher number of IVF/ICSI treatment cycles and a longer time to pregnancy are associated with lower trait anxiety and better mental health. We therefore conclude that at this moment there is no evidence that parents who conceive with IVF/ICSI are in specific need of prevention of and intervention for mental health problems.

Acknowledgements

We thank all couples participating in this study for their cooperation. Furthermore we acknowledge Eva Loomans, MSc, and Hedwig Kikkert, MSc, for their help in data collection.

Authors’ roles

M.H.-A., M.J.H. and A.F.B. initiated the study; K.J.M. and M.L.H. collected the data, M.J.-P, K.J.M. and M.H.-A analysed and interpreted the data, M.J.-P and M.H.-A. drafted the report. All authors commented on drafts, all authors have seen and approved the final version.

Funding

This study was supported by the University Medical Center Groningen, the Cornelia Foundation, Beesterzwaag, the Netherlands and the school for Behavioural- and Cognitive Neurosciences, Groningen, the Netherlands.

Conflict of interest

None declared.

References


