

ORIGINAL ARTICLE

Anxiety, depression, and attachment before and after the first-trimester screening for Down syndrome: comparing couples who undergo ART with those who conceive spontaneously

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ABSTRACT

Objectives This study's aim was to describe the emotional status of parents to be before and after the first-trimester combined prenatal screening test.

Methods One hundred three couples participated, of which 52 had undergone an *in vitro* fertilization/intracytoplasmic sperm injection treatment [assisted reproductive technology (ART)] and 51 had conceived spontaneously. Participants completed the state scale of the State-trait Anxiety Inventory, the Edinburgh Depression Scale, and the Maternal and Paternal Antenatal Attachment Questionnaire before the first-trimester combined prenatal screening test at around 12 weeks of gestational age (T1) and just after receiving the results at approximately 14 weeks of gestational age (T2).

Results We observed a significant decrease in anxiety and depression symptoms and a significant increase in attachment from T1 to T2. Results showed no differences between groups at either time point, which suggests that ART parents are more similar to than different from parents conceiving spontaneously. Furthermore, given the importance of anxiety during pregnancy, a subsample of women with clinical anxiety was identified. They had significantly higher rates of clinical depression and lower attachment.

Conclusions These results indicate that, regardless of whether conception was through ART or spontaneous, clinical anxiety in women over the prenatal testing period is associated with more vulnerability during pregnancy (i.e. clinical depression and less attachment to fetus). © 2015 John Wiley & Sons, Ltd.

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INTRODUCTION

Noninvasive prenatal screening in the first trimester of pregnancy is a standard procedure in most countries. Although screening has obvious medical benefits, studies over the last 10 years have drawn attention to its psychological impact and suggest that it could be an emotional strain on pregnant women and their partners.^{1–3} Anxiety is one of the most studied emotional variables in this context. It has been shown to be highest before the test and, when results are negative, to diminish afterwards.^{4–7} Prepartum depression in connection with prenatal testing has been much less studied but has been shown to follow the same pattern.⁸ These outcomes suggest that the testing itself is stressful and potentially anxiety inducing.⁶ In contrast, studies on prenatal attachment have shown that using an ultrasound for prenatal screening significantly increases the mother's attachment to her fetus.⁹

By providing visual evidence of fetal viability, the test is a strengthening and positive factor.¹⁰ Confirmation of viability may be particularly important for couples who conceive through assisted reproductive technology (ART), because they have been shown to be more anxious during pregnancy about the well-being and viability of their fetus.¹¹

The first-trimester combined prenatal screening test could therefore be considered a moment of psychological activation – both positive and negative – and thus important for understanding parents' psychological status in early pregnancy. However, it has not to our knowledge been investigated in ART populations. Our aim was therefore to assess anxiety and prepartum depression as indicators of parental psychological distress and prenatal attachment as an early indicator of the parent–child bond. To measure change in these variables, we assessed them before and after

prenatal screening in both an ART and a spontaneous conception (SC) population.

Anxiety

Anxiety has been described as an emotional side effect of ART.^{12–14} Higher state anxiety scores have been found in ART populations,^{11,15–17} particularly during early pregnancy.¹⁸ However, most studies indicate no difference in general anxiety between couples undergoing ART treatment and matched control groups.¹⁹ One study found that, compared with controls, women who underwent ART experienced a significantly larger decrease in state anxiety as the pregnancy progressed, although no difference in general anxiety was observed.²⁰ This could indicate that, although mean global scores are similar, the subjective experience is different for ART women, whose distress could be elevated in early pregnancy. Moreover, regardless of the type of conception, high levels of anxiety during pregnancy are of particular interest: Anxiety disorders during pregnancy have been associated with several risk factors, both immediate – such as preterm birth and low birth weight²¹ – and longitudinal – impacting child development negatively on various behavioral and neurobehavioral outcomes.^{22–26} Anxiety disorders also predict the risk of depression in the parents to be in the postpartum period.^{27,28}

Prepartum depression

The prevalence of prepartum depression in community samples has been estimated at around 7% in the first trimester and tends to increase during pregnancy. Depression has been described as one of the most common psychological difficulties associated with the perinatal period.^{29,30} It has been speculated that couples who undergo ART might have a higher prevalence of prepartum depression because the treatment cycles are a psychological stress burden, which could induce depression.³¹ However, recent studies have shown prepartum depression levels not to be significantly different from those observed in a control population.^{32–34}

Prenatal attachment

Prenatal attachment is the bond that develops between the parents to be and the unborn baby.³⁵ It has been shown to predict the mother–infant³⁶ and father–infant³⁷ postnatal relationships, in terms of both interaction and quality of attachment. Studies have shown that prenatal attachment is a developmental factor that increases with gestational age: The more the pregnancy becomes real, the more the parents bond to the imagined baby.³² Studies on prenatal attachment in ART populations have produced mixed results: Some found that ART women had higher prenatal attachment compared with controls,^{38,39} while others found no difference.^{11,32}

Prenatal testing

None of the above studies considered the role of prenatal testing. Yet medical staff need to understand couples' emotional reactions to the psychological experience induced by prenatal testing. Screening asks distressing questions, such as whether the child is viable, healthy, and acceptable for the

parents.⁴⁰ These questions are very distressing. With ART couples, who have wanted a child longer, it is even more important to understand the psychological experience associated with prenatal testing. These couples could react in ways that are difficult for medical staff to handle. A better understanding would increase their ability to support these couples.

Aims and hypotheses

The first aim of the study was to understand the changes in the psychological status of the parents to be from before to after the first-trimester prenatal screening test at around 12 weeks of gestational age, by comparing state anxiety, prenatal attachment, and prepartum depression in couples from an SC group with couples who had undergone *in vitro* fertilization or intracytoplasmic sperm injection, that is, ART. We hypothesized that, provided that the test results were negative, levels of state anxiety and prepartum depression would decrease and fetal attachment would increase over the period from before (T1) to after (T2) testing. We expected the ART group to be more anxious than the SC group at T1, because of their history of infertility, but similar to the SC group at T2, provided that the test results were negative. In line with most previous findings, we did not expect any difference between the groups in attachment or depression at either time point.

Our second aim was to identify a subgroup that was particularly vulnerable because of anxiety, which has been recognized as key to understanding emotional disorders during pregnancy. We selected the individuals whose anxiety score was above the clinical cut-off and hypothesized that their heightened anxiety would be associated with higher levels of prepartum depression and lower prenatal attachment scores at both time points.

METHOD

Population

All patients were offered the same first-trimester combined screening test, followed by a diagnostic test (chorioamniocentesis or amniocentesis) when there was a high risk of trisomy 21. Among the initial 109 couples, the drop-out rate was 5.5% ($N=6$). A total of 52 couples had undergone an ART treatment, and 51 had conceived spontaneously. At T2, there were seven high risk results to the screening tests (five in the ART group and two in the SC group). All seven were excluded from further analysis, whatever the result of the diagnostic test, leaving 96 couples. Sociodemographic and medical factors are presented in Table 1.

Procedure

Participants were recruited by a registered research psychologist during the first trimester, once the pregnancy had been confirmed during the routine doctor's appointment. The couples' obstetrician or midwife presented the study to them and gave them an informational letter. The researcher then called the couples who had agreed to be contacted and fully explained the study. The couples completed an informed

Table 1 Sociodemographic and medical data for the assisted reproductive technology group and the spontaneous conception group

	ART (N = 51)	Spontaneous conception (N = 52)	t-test p-values
Sociodemographic data			
Women's age in years (mean, SD)	34.82 ± 3.86	30.21 ± 4.13	<0.0001
Men's age in years (mean, SD)	37.56 ± 5.03	32.19 ± 5.07	<0.0001
Years of cohabitation (mean, SD)	6.53 ± 2.80	3.23 ± 2.53	<0.0001
Married (% , N)	78.50% (40)	42.31% (22)	<0.0001
Years of desiring a child (mean, SD)	4.21 ± 1.94	0.80 ± 0.59	<0.0001
Couples' socioeconomic class (% , N) ^a			
Upper	9.80% (5)	13.50% (7)	
Upper middle	45.10% (23)	55.70% (29)	
Middle	23.50% (12)	25.00% (13)	
Lower middle and lower	21.60% (11)	5.80% (3)	
Medical data			
Previous pregnancies (% , N)	31.37% (16)	17.31% (9)	0.462
Weeks of amenorrhea T1 (mean, SD)	11.45 ± 1.27	11.54 ± 1.18	0.721
Early pregnancy complications (% , N)	13.73% (7)	3.85% (2)	0.063
Years of infertility work-up (mean, SD)	2.97 ± 2.20		
Source of infertility (% , N)			
Female origin	25.50% (13)		
Male origin	39.20% (20)		
Mixed origin	17.60% (9)		
Undetermined	17.70% (8)		
ICSI (% , N)	64.71% (33)		

ART, assisted reproductive technology; ICSI, intracytoplasmic sperm injection; SD, standard deviation; T1, before testing.

^aSocioeconomic class determined based on each couple's highest indicator of socioeconomic position according to Genoud (2011)⁵⁰: upper (e.g. university-educated senior managers), upper middle (e.g. professionals with a university-level or secondary-level education), middle (e.g. vocationally trained employees), and lower middle and lower (e.g. apprenticeship-trained skilled tradespeople or unskilled laborers).

consent form, a brief questionnaire about their situation (e.g. length of relationship, marital status, and desire to have children), and a brief medical anamnesis (e.g. previous pregnancies and early pregnancy complications) before starting the study. The questionnaires assessing anxiety, depression, and attachment were mailed to the couples with instructions to complete them separately, the day before or the day of (but prior to) the first-trimester combined prenatal screening test and then upon receiving the test results (the same or next day).

The study protocol received approval from the ethics commission of the university hospital (protocol 89/10).

Measures

Anxiety

State anxiety was assessed using the *S-anxiety scale* of the *State-trait Anxiety Inventory form Y-1* (S-STAI),⁴¹ which is a 20-item questionnaire mainly evaluating current tension, nervousness, and worry on 5-point Likert scales. Scores range from 20 to 80, with higher scores indicating greater anxiety. The internal consistency measures were good in the original questionnaire (α between 0.86 and 0.95) and in our sample at T1 ($\alpha = 0.91$) and T2 ($\alpha = 0.92$).

Clinical anxiety. According to the literature, a score of 40 on the S-STAI is the clinical cut-off during pregnancy.⁴² The 18 women who scored above the cut-off on the S-STAI at both T1 and T2 – ten in the ART group and eight in the SC group – made up a 'clinical anxiety group' within our sample. Only two men scored above the cut-off, and both came from the spontaneous pregnancy group; thus, they were not included in our analysis.

Prepartum depression

We assessed prepartum depression with the Edinburgh Depression Scale (EDS),⁴³ which is a validated ten-item self-rating scale. Each item is rated from 0 to 3 on a Likert scale; the maximum score is 30. The EDS assesses depression's most common symptomatology and has been adapted to and validated for the prenatal period.^{44,45} The internal consistency in the initial validation study was strong ($\alpha = 0.87$)⁴³ and good in our sample at T1 ($\alpha = 0.87$) and T2 ($\alpha = 0.81$). According to the literature, scores of 15 or more indicate major prenatal depression.⁴⁶

Prenatal attachment

Parental attachment to the fetus was assessed with the self-reported Maternal Antenatal Attachment Scale⁴⁷ and Paternal Antenatal Attachment Scale.³⁷ The Maternal Antenatal

Attachment Scale has 19 items, and the Paternal Antenatal Attachment Scale 16. Each item is rated from 1 to 5 on a Likert scale (1=absence of feelings for the fetus; 5=very strong feelings for the fetus). The internal consistency was strong in the original validation ($\alpha = 0.82$)⁴⁷ and satisfactory in the French validation study for the total score ($\alpha = 0.71$)⁴⁸ but not for the individual factors. We therefore used only the total score, whose internal consistency in our population was good at T1 ($\alpha = 0.81$) and T2 ($\alpha = 0.82$).

Statistical analysis

All analyses were performed with the IBM Statistical Package for Social Sciences 22. First, the ART and spontaneous pregnancy groups were compared for relevant sociodemographic and medical data in independent *t*-tests (Table 1). None proved significant; they were therefore not included as covariates in the subsequent analyses. Next, we ran a repeated measure analysis of variance (ANOVA) for men and for women to test our second hypothesis comparing the mean anxiety, depression, and attachment scores from T1 to T2 between groups. Time was a within-subject variable, and group was a between-subject variable, allowing the separate effects of time and group and the interaction between them to be examined for each variable.

We then conducted an ANOVA (i.e. with time as a within-subject variable and group as a between-subject variable) to compare the mean anxiety, depression, and attachment scores of the low-anxiety group with those of the clinical anxiety group. Marginal means that were measured for the ANOVAs are provided in Table 2.

RESULTS

Anxiety, depression, and attachment across groups and time

Descriptive statistics for the study variables are provided in Table 2. Results of the ANOVA indicated that time had a significant main effect, except on women's depression. Anxiety decreased significantly in both women, $F(1, 85) = 11.15$, $p = 0.001$, and men, $F(1, 81) = 6.38$, $p = 0.013$, as did depression in men, $F(1, 81) = 4.49$, $p = 0.037$. Attachment increased significantly in both women, $F(1, 85) = 18.27$, $p < 0.001$, and men $F(1, 81) = 14.92$, $p < 0.001$.

There were no significant group effect and no significant interaction effect for men, but there was an interaction effect between time and group for women. Women in the ART group experienced a greater decrease from T1 to T2 in anxiety than women in the SC group, whose anxiety decreased only slightly, $F(1, 85) = 4.62$, $p = 0.034$. For depression, a similar pattern was observed: Prepartum depression tended to decrease in women from the ART group but was stable in women in the SC group, $F(1, 85) = 3.87$, $p = 0.052$.

Clinical anxiety among women

Sociodemographically, there was no significant difference between the 18 women who scored above the clinical cut-off for anxiety (clinical anxiety group: $N = 10$ ART group and $N = 8$ SC group) and those who scored below it (low-anxiety group: $N = 78$) in terms of age ($M = 32.26$, $SD = 4.36$; $M = 32.29$, $SD = 5.14$; $t(23.59) = -0.027$, $p = 0.98$), socioeconomic class ($M = 3.35$, $SD = 0.90$; $M = 3.47$, $SD = 1.01$; $t(22.52) = -0.66$, $p = 0.52$), or years of desiring a child ($M = 2.55$, $SD = 2.29$; $M = 2.28$, $SD = 2.01$; $t(25.03) = 0.47$, $p = 0.64$).

Descriptive statistics for the study variables are provided in Table 3. Time had a main effect on anxiety and attachment in both the clinical anxiety and low-anxiety groups but no significant effect on depression. Anxiety tended to decrease $F(1, 85) = 3.80$, $p = 0.055$. The increase in attachment was significant $F(1, 85) = 13.23$, $p < 0.000$.

Furthermore, the group effect was a main effect and significant for all variables at both time points, indicating that women in the clinical anxiety group were significantly more anxious, $F(1, 85) = 102.73$, $p < 0.000$; more depressed, $F(1, 85) = 20.39$, $p < 0.000$; and less attached to their fetus, $F(1, 85) = 102.73$, $p = 0.009$, compared with the low-anxiety group. In addition, four of the women in the clinical anxiety

Table 2 Mean scores of anxiety, depression, and attachment for the assisted reproductive technology group and the spontaneous conception group, before and after the first round of prenatal testing

	T1		T2	
	ARTN = 47 M(SD)	Spontaneous pregnancyN = 49 M(SD)	ARTN = 47 M(SD)	Spontaneous pregnancyN = 49 M(SD)
Anxiety				
Women	38.64(11.29)	35.81(9.61)	33.41(9.01)	34.51(11.01)
Men	33.92(8.25)	31.48(8.46)	30.06(5.81)	29.59(7.67)
Depression				
Women	6.53(6.21)	5.21(5.26)	5.95(4.39)	5.27(4.26)
Men	3.44(2.92)	3.15(3.07)	2.74(2.65)	2.72(2.72)
Attachment				
Women	73.77(7.06)	73.18(8.86)	76.13(5.56)	75.75(9.04)
Men	57.23(6.46)	56.87(7.13)	58.83(6.65)	58.98(7.52)

ART, assisted reproductive technology; T1, before testing; T2, after testing.

Table 3 Mean scores of anxiety, depression, and attachment of women with clinical anxiety and low anxiety before and after the first round of prenatal testing

	T1		T2	
	Clinical anxiety (N=18)	Low anxiety (N=78)	Clinical anxiety (N=18)	Low anxiety (N=78)
	M(SD)	M(SD)	M(SD)	M(SD)
Anxiety	49.33(7.44)	33.96(8.86)	48.44(7.79)	30.32(6.74)
Depression	9.17(6.92)	4.95(5.21)	9.64(4.65)	3.89(3.32)
Attachment	69.22(10.02)	74.33(7.10)	72.11(7.79)	76.81(7.18)

T1, before testing; T2, after testing.

group (22%) scored 15 or above on the EDS, indicating major prenatal depression. None of the others scored above 13. There was no interaction effect between time and group.

DISCUSSION

Regardless of the mode of conception, anxiety, depression, and attachment scores changed significantly from before to after the combined prenatal screening test. Overall, anxiety and depression decreased, and attachment increased. Results on anxiety confirm findings elsewhere: The prenatal test itself may be stressful and heighten anxiety beforehand, whatever the type of pregnancy. Following results indicating a low risk of trisomy 21, anxiety decreases. As anxiety and depression decrease, attachment increases, indicating that these variables are interrelated. Our hypothesis therefore appears to be supported: Low risk results and a normally progressing pregnancy allow for stronger feelings about the fetus and increasing parent–fetus attachment.

The hypothesis that ART couples would have higher pretest anxiety than SC couples was not confirmed. There was no significant difference between the groups for any of the three variables. However, the pattern for anxiety and depression was different for women in the two groups. The steeper decreases in the ART group could suggest that they feel more relieved by a low-risk prenatal screening test than women from the SC group. In the literature, similar differences have been observed, although not related to the prenatal testing. The decrease in state anxiety was significantly greater even though levels of general anxiety were similar, which could indicate²⁰ that women who undergo ART experience early pregnancy differently on a psychological level. Possible explanations could be the longer time to conceive, combined with fear and worries in the older ART group of the increased risk of miscarriage and chromosomal aberrations (e.g. trisomy 21) with age.

The clinical anxiety group had significantly higher mean anxiety scores and rates of prenatal depression symptoms and significantly lower prenatal attachment to the fetus. Anxiety and depression symptoms could be negatively impacting prenatal attachment, which has been shown in other studies.^{9,35,37,49}

CONCLUSION

The psychological status of couples in the ART population was similar to that of couples who conceived spontaneously –

challenging the idea that ART populations are more vulnerable. However, there were different patterns – particularly for anxiety, which diminished more in women in the ART group. This may be an indication of how important the combined first-trimester prenatal test is for women who have waited longer before conceiving to confirm the healthy progression of the pregnancy and the viability of the fetus. Finally, we observed that, regardless of the mode of conception, clinical anxiety in the first trimester is closely associated with other risk factors – clinical depression and low attachment to the fetus. These results suggest the importance of heightened attention to and clinical follow-up on anxiety disorders in early pregnancy, both in ART populations and in spontaneous pregnancies, particularly around the time of the first-trimester combined prenatal screening test. For those couples who receive psychological counseling – particularly common in those who undergo ART treatment – our results strongly suggest that such counseling should address their pregnancy experience and any anxiety. For couples who only meet the gynecologist at the screening, questions about potential fears might expose underlying anxiety. Counseling could then be recommended to ward off depression symptoms and prevent potential difficulties in developing an attachment to the fetus.

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WHAT'S ALREADY KNOWN ABOUT THIS TOPIC?

- Prenatal testing is known to be emotionally distressing.

WHAT DOES THIS STUDY ADD?

- This study adds to our knowledge about how the prenatal screening test at around 12 weeks of gestational age affects parents who conceive via assisted reproductive technology.
- The influence is similar whatever the mode of conception: Afterwards, anxiety and depression decrease, and prenatal attachment increases.
- Clinical anxiety in women during this period is associated with vulnerability to other risk factors, whatever the mode of conception.

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