Parenting and psychosocial development of IVF children: a follow-up study

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BACKGROUND: This report details a follow-up study of the parent–child relationship and the child’s psychosocial development after IVF. The pilot study compared 31 IVF families and 31 families with a naturally conceived child when the children were aged 2 years. Twenty-seven IVF and 23 control families participated again when the children were aged 8–9 years.

METHODS: Fathers and mothers completed questionnaires assessing parenting variables and the child’s behaviour. For most children, behavioural ratings were also obtained from the child’s teacher.

RESULTS: No significant differences were found between IVF and control parents’ reports of child behaviour, parenting behaviour, parenting stress and most of the parenting goals. The parenting goal adjustment was significantly more important for IVF than for control fathers; religion was more important for IVF than for naturally conceiving mothers. Teacher ratings of the child’s behaviour did not differ significantly between the IVF and control groups. All couples but one had talked to other persons about the IVF conception; 75% of the IVF parents had not yet informed their children. IVF parents who had informed their child observed more (internalizing and for fathers also overall) problem behaviours in their child, compared with IVF parents who had not yet disclosed the IVF conception.

CONCLUSIONS: Parenting and the children’s psychosocial development do not differ significantly between IVF families and control families.

Key words: infertility/IVF/parent–child relations/parenting stress/psychosocial development

Introduction

During the past two decades, thousands of children have been conceived with the assistance of IVF. In Flanders, Belgium, the proportion of IVF deliveries doubled in 6 years, from 0.6% of the total number of births in 1991 to 1.3% in 1997 (Bekaert et al., 1998). Similar rates have been found in other Western countries (Van Balen, 1998). In the case of IVF, the transition to parenting has a particular character. Most couples have been faced with an infertility problem, and many of them must wait for a long time and undergo lengthy procedures before they finally get their much-desired baby. Children are conceived outside the sexual relationship of their parents. Moreover, pregnancies obtained by IVF present a risk of medical complication: compared with the general population, there is an increased risk of multiple birth, miscarriage, prematurity and low birthweight (Van Balen, 1998; review).

In recent years, several studies have been published comparing the parent–child relationship and the child’s psychosocial development in families with children conceived by IVF and families with naturally conceived children (Gibson et al., 2000a; Golombok et al., 2001; Colpin, 2002; reviews). The results are not very conclusive, and most of the measures in the studies revealed no significant differences in the quality of the parent–child relationship and the children’s socio-emotional development between IVF families and families with naturally conceived children. Nonetheless, some studies also revealed positive effects of IVF parenting: IVF parents were found to be highly emotionally involved with their children (Weaver et al., 1993; Golombok et al., 1995, 1996; Van Balen, 1996; Hahn and Di Pietro, 2001), to have less parenting stress (Golombok et al., 1995, 1996) and to feel more competent (Van Balen, 1996). On the other hand, some studies found more negative results for IVF families, with IVF parents reported as being more overprotective than parents with naturally conceived children (Weaver et al., 1993; Hahn and Di Pietro, 2001). In an Australian study, IVF mothers had a lower sense of self-efficacy in care-giving at 4 months post-partum, and they also reported less autonomy-promoting behaviour compared with other mothers of a similar background (McMahon et al., 1997). At 1 year post-partum, the mothers reported an increased concern about risks to their child, and viewed their child as more special than control mothers (Gibson et al., 2000b). Others (Levy-Shiff et al., 1998) noted that 9- to 10-year-old IVF children were scored lower by teachers on measures of socio-emotional adjustment in school and obtained higher scores on (children’s) self-report
measures of anxiety, aggression and depression compared with control children. Moreover, it was also shown (Cook et al., 1997) that the parent–child relationship and the child’s adjustment following IVF may differ according to the social and cultural environment: these authors identified greater difficulties in parental adjustment and child behaviour in assisted conception families in Eastern Europe than in Western Europe.

In a pilot study (Colpin et al., 1995), parent–child relationships and the child’s psychosocial functioning were assessed in families with a 2-year-old, single-born child conceived by homologous IVF and in a control group of families with a naturally conceived child. The investigation included behavioural observations of mother–child interactions in the home, and self-rating questionnaires. No significant multivariate group effects were found for indicators of the parent–child relationship, nor for the parents’ psychosocial functioning.

In this pilot study, as in most of the other studies published until today, the children were very young. They were aged <2 years in some reports (Weaver et al., 1993; Gibson et al., 2000a), while in other investigations toddlers were studied (Cederblad et al., 1996; Van Balen, 1996; Hahn and DiPietro, 2001). In other studies (Golombok et al., 1995, 1996) the children were aged 4–8 years. In earlier publications, it was suggested that parenting in the case of IVF becomes more difficult when children grow older and—as a consequence—more autonomous and independent. Theoretical, clinical and empirical evidence have suggested that issues of separation, autonomy and independence might be particularly at risk in families with a history of infertility and IVF (Colpin et al., 1995; Colpin, 1996; Hammer-Burns, 1999); findings by others in children aged 9 years supported this assumption (Levy-Shiff et al., 1998). Most recently, a report was published of a pilot study in which the children reached adolescence at the time of the follow-up (Golombok et al., 2001). Again, few differences were found between IVF, adoptive and naturally conceiving families, and no significant differences were identified for the measures of the children’s socio-emotional development. However, there were some significant differences between families with a history of infertility on the one hand (IVF and adoptive families) and the control families on the other hand for the quality of the parent–child relationship, both in a more negative and a more positive way. Mothers with a history of fertility problems showed lower levels of sensitive responding towards the child, but they were also perceived as being more dependable than naturally conceiving mothers. Furthermore, there was a difference in the extent to which both mothers and fathers reasoned with the child during a conflict, as assessed by the children (but not by the parents themselves): children from IVF and adoptive families reported less reasoning than did naturally conceived children.

When the children grow older, the question of disclosure (or non-disclosure) of the IVF status to the child becomes increasingly relevant. Recently, several studies have investigated IVF parents’ disclosure practices and attitudes (Greenfeld et al., 1996; Brewaeys et al., 1997; Olivennes et al., 1997; Braverman et al., 1998). In all these studies, a large majority of parents had not yet informed their child (aged 3–10 years) at the time of the study. Brewaeys et al. studied the relationship between secrecy on the one hand, and child emotional and behavioural problems on the other hand (Brewaeys et al., 1997). No significant relationship was found (neither for IVF nor for donor insemination children).

This report details the follow-up of a pilot study (Colpin et al., 1995). The major aim of the study was to extend the research on psychosocial outcomes in IVF children and their parents, through the study of a group of families with IVF children aged 8–9 years, and thus older than most of the children studied to date. It was expected that IVF would have a negative effect on children’s adjustment to the extent that conceiving a child in this way interferes with the quality of the parents’ relationship with their child (Golombok et al., 2001). The focus of the study was on warmth and control—two key aspects of parenting that are considered important for children’s adjustment (Baumrind, 1971; Maccoby and Martin, 1983; Grusec et al., 1997). The research question included four topics:

(i) A comparison of the parent–child relationship between IVF and naturally conceiving families. Based on previous research (Colpin et al., 1995), the hypothesis was tested that IVF parents report more supportive and less autonomy-promoting behaviour towards their child, attach greater value to adjustment and less to autonomy, and report less parenting stress.

(ii) A comparison of the child’s psychosocial development between IVF and naturally conceiving families. Based on the idea that autonomy promotion is at risk and on the findings of previous studies (Colpin et al., 1995; Levy-Shiff et al., 1998), the hypothesis was tested that IVF children present more problem behaviours than naturally conceived children.

(iii) An exploration of the IVF parents’ practices and attitudes towards informing the child about the nature of his/her conception.

(iv) An exploration of the relationship between disclosure on the one hand, and the child’s psychosocial development on the other.

Materials and methods

Subjects

Details of the recruitment procedure of the pilot study have been described previously (Colpin et al., 1995). The pilot study was conducted between 1992 and 1993, and included 31 IVF families and 31 families with a naturally conceived child; all children were first-born singletons and aged 2 years at the time of the study. The IVF group consisted of primiparous women who became pregnant by (homologous) IVF in the academic hospital of Leuven between May 1989 and July 1990. Each IVF child was matched to a naturally conceived child. This comparison group was randomly drawn from the population born on the same day in the same hospital.

The follow-up study was conducted in 1999, when the children were aged 8–9 years. The parents were contacted by mail by the researcher of the pilot study (H.C.), who had visited them at home at the time. The mailing included a letter explaining the nature of the follow-up study, self-reporting questionnaires, and a document asking for permission to send a questionnaire to the child’s schoolteacher. The parents were asked to return the completed questionnaires and teacher permission form. Of 31 IVF families, 27 (87%) agreed to
participate again; of 31 families with naturally conceived children, 23 (75%) were willing to collaborate. Two families in the control group could not be traced. Four IVF families and six control families did not return the questionnaires. Among the 50 families included in the study, seven fathers did not participate (two IVF fathers, five control fathers; two also did not participate in the pilot study). The demographic variables of age and educational level did not differ significantly between participating and non-participating mothers, nor between participating and non-participating fathers in this second stage of the study. During the pilot study, one couple in each group had separated; during the follow-up study, there were three separated couples among the participating families in both groups.

Permission to contact the child’s teacher was obtained from 19 IVF parents and 16 naturally conceiving parents (70% of participating parents in both groups). The teachers were not informed about the precise nature of the study. Rather, they were told that the child was participating in a general study of child rearing. Eighteen teachers of IVF children and 11 teachers of naturally conceived children returned questionnaires. The relatively low response among teachers may be related to the fact that in Flanders, schools are increasingly solicited to participate in all kinds of studies, which causes refusals and non-response. Teacher questionnaires were obtained for 66% of the IVF children and 48% of the control children in this follow-up study.

As was stated in the report of the pilot study (Colpin et al., 1995), demographic and social variables that might distinguish the two research groups were not controlled. First, it was assumed that possible social and demographic differences between the two groups could be (at least partially) attributed to the situation of having a child by IVF. Matching comparisons for this variable would yield a group that was no longer representative (Van Balen, 1998). Furthermore, in case of matching the social and demographic variables, it would not be possible to analyse the specific influence of these matched variables on the results.

The number of one-child families did not differ significantly between the IVF group (33%) and the control group (22%). In both groups, 55% of the children were boys and 45% were girls. IVF parents were significantly older than parents who conceived naturally. The mean age was 39 years for IVF mothers and 35 years for mothers in the control group (t = 4.20, d.f. = 48, P one-tailed < 0.01). The mean age of the IVF fathers (39 years) was also significantly higher than that of fathers in the control group (36 years) (t = 2.78, d.f. = 48, P one-tailed < 0.01). The proportion of mothers with a higher education degree was significantly lower in the IVF group than in the control group (χ² = 11.7, P < 0.01). A similar tendency was found for the fathers, although the proportions were not significantly different. As was mentioned in the report of the pilot study, this is most likely due to a bias in recruitment characteristics rather than to a general difference in educational level between IVF parents and naturally conceiving parents. Whereas the IVF families were recruited from all over the Flemish Community, almost all of the families in the control group lived in the surrounding area of Leuven, which is a university town with a disproportionately large number of highly qualified inhabitants (Colpin et al., 1995). These types of recruitment biases are not uncommon in IVF studies (Van Balen, 1998; Gibson et al., 2000b).

In further analyses, the effects of the parents’ age and the mother’s educational level were controlled by analysis of covariance (Colpin et al., 1995).

**Instruments**

**The parent–child relationship**

As in the pilot study, two levels were distinguished in the parent–child relationship: the behavioural level and the representational level (Colpin et al., 1995).

In order to assess parenting behaviour, the Nijmegen Childrearing Questionnaire (NCRQ) was used. This was developed in 1993 (Gerrits et al., 1993) and subsequently adapted (Gerrits et al., 1996) to measure child-rearing processes of parental support and control in the context of a national survey on parenting in the Netherlands. The adapted version was used in the present study. Eight dimensions of parenting behaviour were assessed: responsiveness; affection-expression; autonomy; rule setting; induction; ignoring; punishment; and material rewarding. Factor analyses (Gerrits et al., 1996) revealed high correlations of responsiveness and affection-expression with one factor (named support); of autonomy, rule setting and induction with a second factor (authoritative control, referring to autonomy promoting behaviour); and of ignoring, punishment and material rewarding with a third factor (restrictive control).

In the present study, the internal consistency of the subscales (Cronbach’s alpha) ranged between 0.60 and 0.90 for the mothers and between 0.64 and 0.86 for the fathers.

Two questionnaires were used to assess the parents’ representations of the parent–child relationship. The Parenting Stress Index (PSI) was used to measure parent stress (Abidin, 1983; de Brock et al., 1992). This instrument is composed of two major parenting stress domains: the parent domain (including the subscales depression, attachment, restriction of role, sense of competence, social isolation, relationship with spouse and parent’s health); and the child domain (including the subscales adaptability, acceptability, demandingness, mood, distractibility/hyperactivity and ‘reinforces parent’). The PSI yields individual scores for each subscale and overall scores for the parent and child domain (obtained by calculating the means of the respective subscales). In the present study, only the major stress domains were analysed. Cronbach’s alpha for the parent domain was 0.94 in the group of mothers, and 0.92 in the group of fathers. For the child domain, alphas were 0.95 for mothers and 0.94 for fathers.

The Questionnaire Parenting Goals (QPG) (Gerrits et al., 1993) assessed four goals in childrearing: adjustment (to be obedient and kind in the relationship with the parents); personal autonomy; ‘achievement and social success’; and religion (the extent to which the parents are committed to a religion). Cronbach’s alphas were superior to 0.80, except for adjustment (0.73) in the group of mothers and personal autonomy (0.76) in the group of fathers.

**The children’s psychosocial development**

The parents completed the Child Behaviour Checklist (CBCL/4-18) (Achenbach, 1991a; Verhulst et al., 1996) and the teachers filled in the complementary Teacher’s Report Form (TRF) (Achenbach, 1991b; Verhulst et al., 1997).

Both questionnaires consisted of two parts: competence and problems. Only the problem part was used in the present study. The CBCL and TRF behaviour profiles provide scores for total problems, two broad-band syndromes (internalizing and externalizing) and eight narrow-band syndromes. For the purpose of the present study, analysis was carried out with the total problem score and the two broad-band syndromes: internalizing and externalizing behaviour. Cronbach’s alpha for CBCL total problem behaviour was 0.90 in both the group of mothers and the group of fathers. For CBCL externalizing behaviour, alphas were 0.86 and 0.81, and for CBCL internalizing behaviour 0.77 and 0.75 respectively for the mothers and fathers. Cronbach’s alpha was 0.93 for the TRF total score, 0.91 for TRF externalizing and 0.89 for TRF internalizing behaviour.

**Informing children and others about the IVF status**

IVF parents were asked to complete the following questions:

1. Do you intend to inform your child about the conception mode? [answering codes: (a) we already informed the child; (b) we intend to inform the child; (c) we do not intend to inform the child; (d) we...
Parenting and psychosocial development of IVF children

Table I. Adjusted means (± SD), effect sizes ($R^2$) and significant ANCOVAs for parenting behaviour (NCRQ), parenting goals (QPG) and parenting stress (PSI) for IVF mothers versus mothers in the control group, and IVF fathers versus fathers in the control group

<table>
<thead>
<tr>
<th></th>
<th>Mothers</th>
<th></th>
<th>Fathers</th>
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<tbody>
<tr>
<td></td>
<td>IVF ($n = 27$)</td>
<td>Control ($n = 23$)</td>
<td>R$^2$</td>
<td>IVF ($n = 25$)</td>
</tr>
<tr>
<td>NCQR parenting behaviour</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Responsiveness</td>
<td>4.9 ± 0.6</td>
<td>5.1 ± 0.5</td>
<td>0.050</td>
<td>4.6 ± 0.41</td>
</tr>
<tr>
<td>Affection-expression</td>
<td>4.9 ± 0.7</td>
<td>4.9 ± 0.8</td>
<td>0.000</td>
<td>4.6 ± 0.61</td>
</tr>
<tr>
<td>Conformist child-rearing</td>
<td>4.9 ± 0.5</td>
<td>5.0 ± 0.5</td>
<td>0.001</td>
<td>5.0 ± 0.3</td>
</tr>
<tr>
<td>Induction</td>
<td>4.1 ± 0.9</td>
<td>4.0 ± 0.8</td>
<td>0.001</td>
<td>3.9 ± 0.9</td>
</tr>
<tr>
<td>Autonomy</td>
<td>3.7 ± 0.6</td>
<td>3.9 ± 0.6</td>
<td>0.011</td>
<td>3.7 ± 0.8</td>
</tr>
<tr>
<td>Ignoring</td>
<td>2.3 ± 0.9</td>
<td>2.4 ± 1.0</td>
<td>0.003</td>
<td>2.6 ± 1.0</td>
</tr>
<tr>
<td>Punishment</td>
<td>3.3 ± 0.8</td>
<td>3.4 ± 0.9</td>
<td>0.003</td>
<td>3.3 ± 0.9</td>
</tr>
<tr>
<td>Material rewarding</td>
<td>3.1 ± 0.5</td>
<td>2.9 ± 0.9</td>
<td>0.007</td>
<td>3.4 ± 0.8</td>
</tr>
<tr>
<td>Parenting stress (PSI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent domain</td>
<td>186 ± 44</td>
<td>188 ± 58</td>
<td>0.000</td>
<td>168 ± 35</td>
</tr>
<tr>
<td>Child domain</td>
<td>207 ± 55</td>
<td>217 ± 68</td>
<td>0.003</td>
<td>212 ± 50</td>
</tr>
<tr>
<td>Parenting goals (QPG)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjustment</td>
<td>4.9 ± 0.4</td>
<td>4.9 ± 0.5</td>
<td>0.005</td>
<td>4.9 ± 0.5$^b$</td>
</tr>
<tr>
<td>Personal autonomy</td>
<td>5.2 ± 0.4</td>
<td>5.2 ± 0.4</td>
<td>0.000</td>
<td>5.3 ± 0.4</td>
</tr>
<tr>
<td>Achievement</td>
<td>4.5 ± 0.6</td>
<td>4.6 ± 0.6</td>
<td>0.009</td>
<td>4.6 ± 0.5</td>
</tr>
<tr>
<td>Religion</td>
<td>3.7 ± 1.1$^a$</td>
<td>3.2 ± 1.2$^a$</td>
<td>0.074</td>
<td>3.6 ± 1.2</td>
</tr>
</tbody>
</table>

$^a$F (1,46) = 4.34, P$_{\text{two-tailed}} = 0.04$.  
$^b$F (1,40) = 3.66, P$_{\text{one-tailed}} = 0.03$.

are not sure what we will do]. In case code a or b was marked, it was asked at what age the parents informed/intended to inform the child.

2. Did you inform other people of the conception mode? [answering codes: (a) nobody; (b) only family; (c) only friends; (d) family and friends]. In case code b, c or d was chosen, an additional open-ended question was asked: How many persons?

Statistical analyses

The differences between IVF parents and parents with a naturally conceived child were tested—separately for the mothers and the fathers—using univariate analysis of co-variance (ANCOVA), with the conception mode as the independent variable. For the mothers, age and educational level were the co-variates. For the fathers, age was the co-variator. First, a test of interaction effects of the independent variable and the co-variates was carried out. Since no significant interaction effects were found, the ANCOVAs were performed with the main effects (Tabachnik and Fidell, 1989). In the tables, means and SDs adjusted for the effects of the co-variates are reported. To test differences in teachers’ TRF scores between the IVF and control group, t-tests were used. To test the relationship between disclosure on the one hand and the child’s psychosocial adjustment on the other, two subgroups were distinguished within the IVF group: a subgroup of parents already having informed their child ($n = 7$) and a group of parents who had not yet informed their child ($n = 20$). Whether means on CBCL and TRF scores differed significantly between IVF mothers/fathers already having informed their child and IVF mothers/fathers who did not yet inform their child, and between the teachers of the IVF children in both subgroups was assessed by t-Tests.

Results

The parent–child relationship

Parenting behaviour and parenting stress did not differ significantly between IVF and naturally conceiving mothers, nor did they between IVF and control fathers (Table I). No significant difference was found between IVF mothers and naturally conceiving mothers for the parenting goals adjustment, personal autonomy and achievement. A significant difference was found for religion: religion was more important for IVF mothers than for control mothers. However, the effect size was small (Green, 1991), and only 7% of the variance in the parenting goal ‘religion’ was related to the conception status. For the fathers, a small but significant difference between the IVF and control group was found for the parenting goal adjustment. As was expected, IVF fathers attached greater importance to adjustment than control fathers. Again, the effect size was small: the variables ‘IVF versus control group’ and the parenting goal ‘religion’ only had 8% of common variance. The other parenting goals did not differ significantly between the two groups of fathers. However, a tendency towards statistical significance was found for religion ($F(1,40) = 3.66, P_{\text{two-tailed}} = 0.06$), with 8% common variance.

The child’s behaviour

All mean values for the subgroups (Table II) on CBCL and TRF fell within the normal range (for all three subscales, behaviour is considered ‘normal’ if the score is $<60$) (Verhulst et al., 1996, 1997).

IVF parents’ CBCL ratings of the child’s problem behaviour were not significantly different from control parents’ ratings. Neither were significant differences seen in TRF ratings between IVF and control children’s teachers, although TRF ratings for total problem behaviour were considerably higher in the IVF group. Here, a tendency toward statistical significance was found ($t = 1.61$, d.f. = 26, $P_{\text{one-tailed}} = 0.06$). The effect size was small (almost 9% common variance) (Green, 1991).

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Table II. Adjusted mean (± SD) and effect sizes ($R^2$) for child behaviour problems (CBCL) for IVF mothers versus mothers in the control group and IVF fathers versus fathers in the control group, and for child behaviour problems (TRF) for IVF children’s teachers versus control children’s teachers.

<table>
<thead>
<tr>
<th></th>
<th>Mothers</th>
<th></th>
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<th>Fathers</th>
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<th>Teachers</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>$R^2$</td>
<td></td>
<td></td>
<td>$R^2$</td>
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<td></td>
<td>$R^2$</td>
</tr>
<tr>
<td>Internalizing behaviour</td>
<td>5.2 ± 3.5</td>
<td>5.1 ± 4.7</td>
<td>0.000</td>
<td>4.0 ± 3.7</td>
<td>3.4 ± 3.2</td>
<td>0.007</td>
<td>9.0 ± 8.7</td>
<td>7.0 ± 4.9</td>
<td>0.002</td>
</tr>
<tr>
<td>Externalizing behaviour</td>
<td>5.9 ± 3.3</td>
<td>7.9 ± 6.1</td>
<td>0.019</td>
<td>5.0 ± 4.6</td>
<td>4.9 ± 3.9</td>
<td>0.000</td>
<td>6.9 ± 7.5</td>
<td>4.9 ± 6.3</td>
<td>0.019</td>
</tr>
<tr>
<td>Total problem behaviour</td>
<td>18.3 ± 11.1</td>
<td>21.2 ± 14.6</td>
<td>0.008</td>
<td>14.9 ± 11.9</td>
<td>15.1 ± 10.2</td>
<td>0.000</td>
<td>29.9 ± 17.4</td>
<td>19.4 ± 16.2</td>
<td>0.088</td>
</tr>
</tbody>
</table>

Notifying children about the IVF conception

Seven couples (26% of the IVF group) had already informed their child of the IVF conception. Sixteen couples of parents (59%) reported that they intended to notify their child later on. In three families (11%), parents were not yet sure whether they would inform the child. One couple of parents said they would certainly not inform the child.

Parents who had already informed their child had done so when he or she was between 4 and 8 years old. Parents intending to inform their child were asked when they would do so, and most suggested an age between 10 and 14 years. One couple mentioned they would inform the child at age 18, while three couples said they would tell, ‘When the time is ripe’, or when the children, ‘Would ask questions’.

Three couples (11%) did not reveal the IVF status to anyone else, while 24 couples (89%) told other people of the IVF conception. One couple (4%) informed only friends, another couple (4%) only family members, and 22 couples (81%) informed both family and friends.

In two cases (one couple who informed only family, and one couple who informed only friends), fewer than five persons were informed. Nine couples (33% of the IVF couples) revealed the IVF status to a number of persons (between 10 and 30), and four families (15%) informed more than 50 persons. The remaining nine couples (33%) did not mention a number of families, but provided a qualitative statement (e.g. ‘many’, or ‘do not know exactly how many’).

The one couple that did not intend to inform the child did not reveal the IVF status to anyone else. Of the three couples reporting uncertainty about whether or not to inform the child, one did not inform others, one couple informed five persons, and the other couple 20 persons. Of those who intended to reveal the IVF status to the child (but had not yet revealed it), one couple did not inform others, while the remaining couples informed between 20 and 100 persons.

The relationship between disclosure and adjustment

Table III shows that children who were informed of the IVF conception obtained significantly higher mean scores (indicative of more problem behaviour, but still within the normal range) (Verhulst et al., 1996, 1997) on the CBCL scale internalizing problem behaviour—both from their mother and father—compared with children who had not been informed. The effect size was moderate for the mothers (23% of common variance) and large for the fathers (58% of common variance) (Green, 1991). Differences between the two subgroups of teachers for the TRF scale internalizing problem behaviour were small, and not significant.

No significant difference was found (nor any tendency towards significance) on CBCL (TRF) scores for externalizing problem behaviour between the mothers/fathers/teachers of children who had already been informed and the mothers/fathers/teachers of children who had not yet been informed of the IVF conception.

Children who had been informed of the IVF conception obtained significantly higher mean scores (but still within the normal range) on ‘total problem behaviour’ from their fathers compared with children who had not been informed; the effect size was quite large (28% of common variance). The differences for the subgroups of mothers and the subgroups of teachers were small and not significant.

Discussion

Very few significant differences were found in the quality of the parent–child relationship and the child’s psychosocial development between IVF families and families with naturally conceived children. The significant differences for two subscales of the QPG must be interpreted with caution, since they are the only significant results among many statistical tests.

The parenting goal of adjustment was significantly more important for IVF fathers than for control fathers. It has been suggested that IVF parents might have high expectations towards their child (Hammer-Burns, 1987, 1999; Roegiers and Delaisi de Parseval, 1994). Consequently, it is not surprising that such parents would expect, more than naturally conceiving parents, their children to adjust to their own and others’ expectations. The greater importance of adjustment is in line with the finding by others (Golombok et al., 2001) of a lower level of reasoning during conflict with their pre-adolescent child among IVF parents. It may (partly) explain the more negative findings on autonomy-promoting behaviour by IVF parents in some studies (but not in the present case) [see Introduction: (Weaver et al., 1993; McMahon et al., 1997; Hahn and DiPietro, 2001)]. A significant difference between IVF and naturally conceiving mothers was found for the parenting goal ‘religion’; for the fathers, a tendency towards statistical significance was found. Several reasons could explain why religion would be a more important parenting goal for IVF parents. The first reason refers to the data collection method. All families in our study were recruited in one hospital, namely of the Catholic University of Leuven. As was
mentioned in the ‘subjects’ setting, couples were recruited from the entire region of Flanders to this hospital for IVF treatment, while naturally conceiving mothers delivering in this hospital lived mainly in the areas surrounding Leuven. It was presumed that couples seeking help in the catholic university hospital—perhaps more than couples going to secular university hospitals, albeit with a good reputation—valued religion highly. The second reason was that it was possible that those people who valued religion highly were truly over-represented among the IVF population. The catholic religion (which is largely dominant in Flanders) attaches great value to having children, and it is possible that, when faced with fertility problems, catholic people would be more inclined to make use of fertility techniques than would secular people, as it might be difficult for them to consider alternative life goals when confronted with involuntary childlessness. Another potential explanation is that people, when faced with the difficult issue of infertility, will turn to religion for support, and hence be more sensitive to this value. However, it might be argued that the Roman Catholic Church has some of the most restrictive negative views on the use of assisted reproductive technologies (Mołock, 1999). IVF, among other techniques, is viewed as impermissible because the procedure separates human procreation from sexual intercourse and does not protect human life (there is concern that the zygotes may be damaged or destroyed during the procedure). Yet many Catholics in Western Europe do not strictly observe the standards of the Catholic Church, even if they are (very) devoted to its doctrine. Still, the infertility treatment may cause religious conflicts among couples devoted to the catholic religion. This may explain why these couples might be more attracted by a catholic hospital; they may consider the decision by the (catholic) authorities of this hospital to perform IVF as an implicit approval of the technique. Moreover, it may be difficult to discuss this option with others in a society where the catholic religion—including its standards—are still deeply rooted, thereby excluding potential sources of social support. However, most couples in the present study seemed able to discuss the IVF conception with others. In conclusion, the findings of the present study underline the previously expressed opinion (Mołock, 1999) that infertility counsellors should have an understanding of how religious backgrounds might shape the understanding and psychological impact of infertility, and how it shapes the perception of the available treatment options.

The more positive findings in some studies that IVF parents would be more emotionally involved with their child (Weaver et al., 1993; Golombok et al., 1995, 1996; Van Balen, 1996; Hahn and DiPietro, 2001), have less parenting stress (Golombok et al., 1995, 1996) and feel more competent (Van Balen, 1996) were not supported in the present study. Neither were the more negative findings of some studies, that IVF parents would be less sensitive (Golombok et al., 2001), less effective in control with respect to the child’s autonomy (Weaver et al., 1993; McMahon et al., 1997; Hahn and DiPietro, 2001) and that IVF children would have more behavioural problems (Levy-Shiff et al., 1998). In this way, the present study confirms the findings of previous studies with younger children—those mentioned above and others (Raoul-Duval et al., 1993; Cederblad et al., 1996; Montgomery et al., 1999)—and the single study with older children (Golombok et al., 2001) that there are no large differences in the parent–child relationship, and the child’s psychosocial adjustment between IVF families and families with naturally conceived children. One important limitation of the present study was the small numbers of participants, which implies that only large differences turn out to be significant. However, when looking at the effect sizes, it appeared that the differences between IVF mothers and naturally conceiving mothers and between IVF fathers and control fathers were in fact (very) small for most of the non-significant, and even for the significant, subscales.

This pilot study was one of the first (and, to date, very few) studies to use observational measures in the study of IVF parenting. Due to practical and financial restrictions, only questionnaires could be used in this follow-up study. In earlier publications, attention was drawn to the restrictions of self-reporting measures, in particular when studying IVF parenting (Colpin et al., 1995; Colpin, 1996; Van Balen, 1996; Golombok et al., 2001). IVF parents know that researchers are interested in them because of their particular fertility history, and therefore they may be motivated to make a good impression in the study and—even more importantly—for their children to make a good impression. It was suggested that social desirability could possibly (partially) explain the higher involvement with the

### Table III. Means (± SD) and effect sizes ($R^2$) for child behaviour problems (CBCL) for IVF mothers whose child had been informed of the IVF conception versus IVF mothers whose child had not been informed, IVF fathers whose child had been informed versus IVF fathers whose child had not been informed, and for child behaviour problems (TRF) for teachers of IVF children having been informed and teachers of IVF children not having been informed

<table>
<thead>
<tr>
<th></th>
<th>Mothers Disclosure (n = 7)</th>
<th>Mothers No disclosure (n = 20)</th>
<th>Fathers Disclosure (n = 4)</th>
<th>Fathers No disclosure (n = 19)</th>
<th>Teachers Disclosure (n = 5)</th>
<th>Teachers No disclosure (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internalizing behaviour</td>
<td>$7.8 \pm 3.7^a$</td>
<td>$3.8 \pm 3.1^a$</td>
<td>$10.0 \pm 5.1^b$</td>
<td>$2.4 \pm 1.8^b$</td>
<td>$8.8 \pm 9.0$</td>
<td>$9.0 \pm 8.9$</td>
</tr>
<tr>
<td>Externalizing behaviour</td>
<td>$4.8 \pm 4.3$</td>
<td>$6.7 \pm 5.6$</td>
<td>$8.2 \pm 5.6$</td>
<td>$4.3 \pm 4.2$</td>
<td>$3.6 \pm 4.9$</td>
<td>$8.2 \pm 8.1$</td>
</tr>
<tr>
<td>Total problem behaviour</td>
<td>$19.5 \pm 11.1$</td>
<td>$17.9 \pm 11.1$</td>
<td>$14.9 \pm 11.9^a$</td>
<td>$28.5 \pm 18.9^a$</td>
<td>$26.0 \pm 22.74$</td>
<td>$31.5 \pm 15.5$</td>
</tr>
</tbody>
</table>

$^{a}t = 2.79$, d.f. = 25, $P_{two-tailed} = 0.0099$.  
$^{b}t = 5.48$, d.f. = 21, $P_{two-tailed} = 0.0000$.  
$^{c}t = 2.90$, d.f. = 21, $P_{two-tailed} = 0.0084$. 
child stated in some studies. Considering all these reflections, the children’s teachers were included in this follow-up study. However, the data collected among these respondents revealed only one tendency towards statistical significance, with a small effect size and means indicative of normal behaviour. The results obtained from the teachers must be interpreted with great caution, and are to be seen as indicators for further study, as this was a very small, parent- and self-selected group. Taking this limitation into account, the findings of the present study tend to support those of others (Levy-Shiff et al., 1998), that IVF children’s teachers reported more psychosocial problems than control children’s teachers. However, others (Golombok et al., 1995, 1996) did not find any significant difference in teacher ratings between IVF and naturally conceived children. In a Taiwanese study (Hahn and DiPietro, 2001), IVF children were even rated by teachers as having fewer behavioural problems than control children. It is interesting to consider why in the present study teacher ratings tended to show significant differences between IVF and control children, but parent ratings did not. Social desirability might have prevented IVF parents from observing and/or reporting child problem behaviours (Colpin et al. 1995). On the other hand, it is possible that IVF children have problems (within the normal range) that manifest at school, but not at home. If IVF parents have high expectations towards their children, attach great value to adjustment, and are less effective in autonomy-promoting (not supported by the present study, but by others, the children might react by behaving well at home yet compensate by more negative behaviour at school.

The present study confirms the findings of previous research that most parents had not yet informed their children at the time of the study (Greenfeld et al., 1996; Brewaeys et al., 1997; Braverman et al., 1998). As in certain other studies (Greenfeld et al., 1996; Brewaeys et al., 1997; Olivennes et al., 1997), most parents intended to tell the children at a later date. Most of the parents had talked to other persons outside the family about the IVF conception.

The comparison of IVF children who had and had not been informed of the IVF conception revealed interesting results: IVF children who were informed showed significantly more internalizing problem behaviours (according to both their parents) compared with non-informed IVF children; fathers of informed children also gave higher ratings on overall problem behaviour. It is important to note, however, that all means fell within the range of ‘normal’ behaviour. Again, these findings must be interpreted with great caution due to the very small number of couples participating, and are mainly relevant in the light of further study. They indicate, however, that the question whether or not to disclose—and how to disclose—the IVF conception to the child and to other persons outside the family is in an important issue in IVF counselling.

It might be hypothesized that very young children are not yet mature enough to understand fully and correctly the information about their IVF conception, and that disclosure might cause feelings of anxiety and worry (the kind of problems referred to by the CBCL scale as ‘internalizing problem behaviour’). On the other hand, it is important to point to the correlational nature of these findings; they do not allow the conclusion to be made that informing children of their IVF status at age ≤8 years has a negative effect on their adjustment. It is possible that both informing children at a young age and internalizing problem behaviours are related to a third, causal factor. For example, parents failing to cope with the infertility or treatment history might mix up the child with their problems; one way to do this would be to inform the child about this special pre-conception history. This situation may charge the child with emotional problems (e.g. anxiety, worry, feelings of depression, etc.). The questionnaire used in the present study did not investigate who informed the child of the IVF conception or how the child was informed. It cannot be excluded that children have been informed accidentally by a slip of the tongue and/or by a person outside the family (a not unlikely situation, as for most families many outsiders know about the IVF conception) which might be shocking for a child (Papp, 1993). Moreover, it is possible that the children have not been informed in the most appropriate manner. In that respect, the finding that most parents intended to tell the children but had not yet done so might be related to age and also to the fact (supported by clinical experience) that parents—even if they are willing—do not know how to tell their children. Studies have shown that communication between parents and children about sex in general is often difficult (Ravesloot, 1997); it could be expected that this applies even more to telling children that they were conceived by IVF. There is very little helpful literature available for parents about this particular topic, and the issue clearly requires further attention both in research and practice.

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References
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