

Non-genetic and non-gestational parenthood: consequences for parent–child relationships and the psychological well-being of mothers, fathers and children at age 3

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BACKGROUND: Findings are presented of the third phase of a longitudinal study of children conceived by assisted reproduction procedures involving surrogacy and/or donor conception. **METHODS:** At the time of the child's third birthday, 34 surrogacy families, 41 donor insemination families and 41 oocyte donation families were compared with 67 natural conception families on standardized interview and questionnaire measures of the psychological well-being of the parents, mother–child relationships and the psychological well-being of the child. **RESULTS:** The differences found between family types reflected higher levels of warmth and interaction between mothers and their 3-year-old children in assisted reproduction families than in families with a naturally conceived child. A higher proportion of surrogacy parents than donor conception parents had told their children about the nature of their birth. **CONCLUSIONS:** It appears that the absence of a genetic and/or gestational link between parents and their child does not have a negative impact on parent–child relationships or the psychological well-being of mothers, fathers or children at age 3.

Key words: child development/donor insemination/oocyte donation/parenting/surrogacy

Introduction

Advances in reproductive medicine since the birth of the first baby through IVF in 1978 have resulted in more than 1 million babies conceived by assisted reproduction, and it has been estimated that in some European countries up to 5% of births are now due to assisted reproduction procedures (Vayena *et al.*, 2002). In these families, it may be expected that the circumstances of the birth may influence parents' thoughts, feelings and behaviour towards their child, particularly when donated gametes and/or a surrogate mother is involved. A concern is that parents may feel or behave less positively towards a non-genetic or non-gestational child, which may have a negative effect on the child's identity and psychological well-being.

Different types of assisted reproduction have raised specific concerns arising from the different patterns of genetic and gestational relationships between parents and the child. With respect to gamete donation, fathers, in particular, have been predicted to be more distant from a non-genetic child (Daly and Wilson, 1989; Baran and Pannor, 1993). Studies of step-parent families, which are similar to gamete donation families in that there is no genetic tie between one parent and the child, point to difficult relationships between step-parents and step-children (Hetherington and Clingempeel, 1992; Dunn *et al.*,

1998; Hetherington and Stanley-Hagan, 2002). However, the formation of a stepfamily brings with it a number of stresses that may affect the quality of parenting that are not present in gamete donation families including the disruption of a relationship with an existing parent and the need to negotiate relationships with new family members. Interestingly, Dunn *et al.* (2000) found parents in stepfamilies that included both step-children and genetically related children to be less affectionate towards, and less supportive of, their stepchildren than their own biological children. Nevertheless, gamete donation families differ from stepfamilies in important ways; the parents have chosen to raise the child, have done so from birth, and generally present the child to others as their own. It cannot be assumed, therefore, that assisted reproduction parents will be like step-parents with respect to the quality of their relationship with their non-genetic child.

In the case of surrogacy, the separation of gestational parenthood from social parenthood is similar to adoption in that the mother who gives birth relinquishes the child to other parents. It might be expected, therefore, that children born through surrogacy, like adopted children, will show raised levels of psychological problems (Brodzinsky *et al.*, 1998; Brodzinsky and Pinderhughes, 2002). However, as Brodzinsky and colleagues point out, the higher rates of psychological problems shown by

adopted children are largely associated with late placement in an adoptive family and adverse early childhood experiences. Children born through a surrogacy arrangement are more akin to early adopted children who are much less at risk for emotional or behavioural problems as they grow up. Thus, the findings of studies of adopted children should not necessarily be extrapolated to children born through a surrogacy arrangement.

The aim of this study was to provide data on the quality of parenting and the psychological development of children in assisted reproduction families where parents lack a genetic and/or gestational link with their child. In earlier phases of this longitudinal study, conducted when the children were 1 and 2 years old, data were obtained from representative samples of oocyte donation families (where the child lacks a genetic link with the mother but not the father), donor insemination families (where the child lacks a genetic link with the father but not the mother), surrogacy families (where the child lacks a gestational link with the mother, and in some cases lacks a genetic link as well) and a matched comparison group of natural conception families. It was found that the absence of a genetic and/or gestational link between a parent and the child did not jeopardize parenting or children's psychological adjustment at age 1 (Golombok *et al.*, 2004a,b) or age 2 (Golombok *et al.*, 2005, 2006). This study focuses on these families at the time of the child's third birthday just as some parents are beginning to discuss the nature of the birth with their child.

Materials and methods

Participants

Thirty-four families with a child born through a surrogacy arrangement, 41 families with a child conceived by oocyte donation and 41 families with a child conceived by donor insemination were studied in comparison with 67 families with a naturally conceived child. The surrogacy families represent 81% of the sample first recruited through the General Register Office of the United Kingdom Office for

National Statistics and the United Kingdom surrogacy agency known as Childlessness Overcome through Surrogacy (COTS) around the time of the child's first birthday. The oocyte donation and donor insemination families represent 80% and 82%, respectively of the original samples recruited through nine fertility clinics in the United Kingdom when the child was around 1 year old. The natural conception families were selected through maternity ward records on the basis of stratification to maximize comparability with the oocyte donation and donor insemination families and represent 84% of the initial sample. In 59% of the surrogacy families, the surrogate mother was the genetic mother of the child (partial surrogacy) and in the remaining 41% of families, the commissioning mother was the genetic mother (full surrogacy). Nine of the oocyte donation families had conceived their child with the help of a known donor. Of the families lost to follow-up, around half could not be traced and the other half declined to participate. A detailed description of the original sampling procedures is presented in Golombok *et al.* (2004a,b).

Sociodemographic information for each group is summarized in Table I. There were similar proportions of boys and girls in each family type, and the age of the children did not differ between groups. There was a significant group difference in the age of the mothers, $F(3, 179) = 18.68, P < 0.001$. The oocyte donation mothers were the oldest, with a mean age of 43 years, and the donor insemination and natural conception mothers were the youngest with a mean age of 37 years. A group difference was also found for social class, $\chi^2(9, n = 183) = 24.72, P < 0.01$, as measured by the occupation of the parent with the highest ranking position according to a modified version of the Registrar General's classification (Office of the Population and Census Statistics and Employment Department Group, 1991) ranging from 1 (professional/managerial) to 4 (partly skilled or unskilled). This difference represented a lower proportion of donor insemination families in professional or managerial occupations. The number of siblings in the family differed significantly between groups $\chi^2(9, n = 183) = 30.41, P < 0.001$, with fewer siblings in the assisted reproduction families than in the natural conception families. As significant differences between groups were found for mother's age, social class and number of siblings in the family, these variables were entered into the statistical analyses as covariates.

Table I. Sociodemographic information by family type

| | Surrogacy | | Donor insemination | | Oocyte donation | | Naturally conceived | | F | P |
|--------------------------|-----------|------|--------------------|------|-----------------|------|---------------------|------|----------|----------|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | | |
| Age of child (months) | 36.29 | 1.29 | 36.39 | 0.83 | 36.76 | 1.04 | 36.63 | 0.83 | 1.87 | NS |
| Age of mother (years) | 41.76 | 5.36 | 37.46 | 3.62 | 43.05 | 6.73 | 37.13 | 3.14 | 18.68 | <0.001 |
| | <i>n</i> | | <i>n</i> | | <i>n</i> | | <i>n</i> | | χ^2 | <i>P</i> |
| Child's sex | | | | | | | | | | |
| Boy | 18 | | 24 | | 26 | | 32 | | 2.84 | NS |
| Girl | 16 | | 17 | | 15 | | 35 | | | |
| Social class | | | | | | | | | | |
| Professional/managerial | 22 | | 16 | | 22 | | 46 | | 24.72 | <0.01 |
| Skilled/non-manual | 6 | | 11 | | 14 | | 17 | | | |
| Skilled manual | 1 | | 9 | | 3 | | 2 | | | |
| Partly skilled/unskilled | 5 | | 5 | | 2 | | 2 | | | |
| Number of siblings | | | | | | | | | | |
| None | 15 | | 15 | | 26 | | 11 | | 30.41 | <0.001 |
| One | 17 | | 22 | | 11 | | 46 | | | |
| Two | 2 | | 4 ^a | | 4 | | 10 | | | |

NS, not significant.

^aIncludes one donor insemination child with three siblings.

Researchers trained in the study techniques visited the mothers at home. Data were obtained from the mother by tape-recorded interview and questionnaires and from the father by questionnaires. Fathers were not interviewed at this phase of the study as fathers are generally less available for interview than are mothers, and the fathers participated in an in-depth interview when the child was aged 2. Information obtained by interview was rated according to a standardized coding scheme, and regular meetings were held to minimize rater discrepancy.

Measures

Parents' psychological state

Mothers and fathers completed the Golombok Rust Inventory of Marital State (GRIMS) (Rust *et al.*, 1990), a questionnaire assessment of the quality of the marital relationship with higher scores indicating poorer marital quality. Split-half reliability is .91 for men and .87 for women, and the GRIMS has been shown to discriminate significantly between couples who are about to separate and those who are not. The Trait Anxiety Inventory (Spielberger, 1983) and the Edinburgh Depression Scale (Thorpe, 1993) were also completed by both mothers and fathers to assess anxiety and depression respectively. Both of these instruments, for which higher scores represent greater difficulties, have been shown to have good reliability and to discriminate well between clinical and non-clinical groups.

The short form of the Parenting Stress Index (PSI/SF) (Abidin, 1990), a standardized assessment of stress associated with parenting, was administered to mothers and fathers separately to produce a total stress score for each parent, as well as sub-scale scores of parental distress, dysfunctional interaction and difficult child, with higher scores reflecting greater parenting stress. Test-retest reliability for the total score was found to be 0.96 over a 1- to 3-month interval and 0.65 over 1 year. Concurrent and predictive validity has been demonstrated for the full-length questionnaire, and the short form has been reported to correlate very highly with the full-length version.

Quality of parenting

The mothers were interviewed using an adaptation of a standardized interview designed to assess the quality of parenting (Quinton and Rutter, 1988). Detailed accounts were obtained of the child's behaviour and the mother's response to it, and the following ratings were made according to strict coding criteria taking into account information obtained from the entire interview: (1) *expressed warmth* was rated on a 6-point scale from 0 (none) to 5 (high) and was based on the mother's tone of voice, facial expression and gestures when talking about the child, spontaneous expressions of warmth, sympathy and concern about any difficulties experienced by the child and enthusiasm and interest in the child as a person; (2) *emotional over-involvement* was rated on a 4-point scale from 0 (little or none) to 3 (enmeshed) and measured the extent to which family life and the emotional functioning of the mother was centred on the child, the extent to which the mother was over concerned or overprotective towards the child, and the extent to which the mother had interests apart from those relating to the child; (3) *mother-child interaction* was rated on a 5-point scale from 0 (very poor) to 4 (very high) and measured the extent to which the child and mother spent time together, enjoyed each other's company and showed affection to one another; (4) *sensitive responding* was rated on a 5-point scale from 0 (none) to 4 (very sensitive responding) and represented the mother's ability to recognize and respond appropriately to her infant's needs. This interview procedure has been validated against observational ratings of mother-child relationships in the home, demonstrating a high level of agreement between global ratings of the quality of parenting by interviewers and

observers (Quinton and Rutter, 1988). Inter-rater reliabilities were calculated from 30 randomly selected interviews coded by a second interviewer who was 'blind' to family type. Agreement within one scale point for expressed warmth, emotional involvement, mother-child interaction and sensitive responding was 90%, 100%, 100% and 97%, respectively.

Children's psychological adjustment

The presence of behavioural or emotional problems in the children was assessed using the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1994, 1997) administered to mothers. The questionnaire has been shown to have good inter-rater reliability, with correlations between parent and teacher scores reported to be 0.62. Evidence for validity comes from the high correlations between the total deviance score of the SDQ and the total score of the Rutter Parent Questionnaire (Rutter *et al.*, 1970) and the Rutter Teacher Questionnaire (Rutter, 1967), which were designed to assess child psychiatric disorder. In addition, the SDQ discriminates well between psychiatric and non-psychiatric samples.

Experiences of assisted reproduction

Mothers of children conceived by donor insemination, oocyte donation and surrogacy were administered an additional section of the interview that focused on issues directly related to the method of the child's conception. Systematic information was obtained from mothers on whether or not the parents had told or planned to tell the child about the method of his or her conception, the parents' reasons for their decision, whether or not the parents had told other people about the child's conception and disclosure to grandparents. Information was also obtained from the commissioning mothers in surrogacy families and from the oocyte donation mothers with known donors about the frequency of the family's contact with the surrogate mother or oocyte donor, their relationship with her and their feelings about her involvement with the child. The data were rated according to strict coding criteria derived from an earlier investigation (Cook *et al.*, 1995). The coding categories are described in detail in the *Results* section.

Results

Multivariate analyses of covariance (MANCOVAs) were carried out for the questionnaire variables relating to parental psychological state for mothers and fathers separately and for the variables relating to quality of parenting derived from the interview with mothers. Analysis of covariance (ANCOVA) was conducted for the Strength and Difficulties Questionnaire. The covariates were mother's age, social class and number of children in the family. Where a significant group difference was found, Helmert contrasts were carried out to address specific questions: (1) assisted reproduction versus natural conception (AR versus NC) to establish whether the assisted reproduction families differed from the natural conception families, (2) oocyte donation and surrogacy versus donor insemination (OD/S versus DI) to establish whether families where the mother lacked a genetic or gestational link with the child differed from families where the father lacked a genetic link with the child and (3) oocyte donation versus surrogacy (OD versus S) to establish whether families where the mother lacked a genetic link with the child differed from families where the mother lacked a gestational link (sometimes in combination with the absence of a genetic link as well). For parents' experiences of assisted reproduction, comparisons between the oocyte

donation, donor insemination and surrogacy families were carried out using chi-square tests.

Parents' psychological state

Mothers' scores on the Trait Anxiety Inventory, the Edinburgh Depression Scale, the GRIMS and the PSI were entered into a MANCOVA. Wilks's λ was not significant. Similarly, fathers' scores on the Trait Anxiety Inventory, the Edinburgh Depression Scale, the GRIMS and the PSI were entered into a MANCOVA and again Wilks's λ was not significant.

Quality of parenting

The expressed warmth, emotional over-involvement, mother-child interaction and sensitive responding variables from the mother's interview were entered into a MANCOVA. Wilks's λ was significant, $F(12, 452) = 1.93, P < 0.05$. As summarized in Table II, one-way ANCOVAs showed a significant difference between family types for expressed warmth, $F(3, 174) = 4.59, P < 0.01$, and mother-child interaction, $F(3, 174) = 4.31, P < 0.01$. For expressed warmth, the Helmert contrasts showed this difference to reflect a higher level of expressed warmth among the assisted reproduction mothers than the natural conception mothers (AR versus NC, $P < 0.001$). Regarding mother-child interaction, the Helmert contrasts identified higher levels of mother-child interaction among the assisted reproduction mothers than the natural conception mothers (AR versus NC, $P < 0.05$), and higher levels of mother-child interaction in oocyte donation and surrogacy families than in families with a donor insemination child (OD/S versus DI, $P < 0.01$).

Children's psychological adjustment

There was no significant difference between family types for the total score of the SDQ (Table II).

Experiences of assisted reproduction

As summarized in Table III, there was a significant difference between parents in the different family types regarding disclosure to their child about the method of their conception, $\chi^2(6, n = 116) = 40.30, P < 0.001$. Whereas 44% of the commissioning parents of children born through surrogacy had begun to discuss this issue with their 3-year-old child, only 7.3% of

oocyte donation parents and 4.9% of donor insemination parents had begun to do so by the time of their child's third birthday. Moreover, 46% of the donor insemination parents had decided against telling their child, whereas this was true of only 22% of the oocyte donation parents and none of the surrogacy parents. The remaining parents were either undecided about whether or not to tell or planned to disclose this information to their child in the future. Those who had told or planned to tell their child were asked to give their reasons for this decision, and these were classified according to the following categories: 'Child has a right to know', 'To avoid disclosure by someone else' and 'No reason not to'. Many parents gave more than one reason for their intention to tell their child, and each was rated separately. The most commonly cited reasons were that the child has a right to know (given by 55% of surrogacy parents, 68% of oocyte donation parents and 83% of donor insemination parents) and to avoid disclosure by someone else (given by 59% of surrogacy parents, 29% of oocyte donation parents and 59% of donor insemination parents). Thirty-one percent of surrogacy parents, 21% of oocyte donation parents and 17% of donor insemination parents said that there was no reason not to tell.

The oocyte donation and donor insemination parents who had decided against telling their child were also asked for their reasons which were classified according to the following categories: 'To protect the child', 'To protect the mother' and 'To protect the father'. Twenty-two percent of the oocyte donation parents and 53% of the donor insemination parents wished to protect the child. There was also a desire to protect the non-genetic parent, with 44% of the oocyte donation parents wishing to protect the mother, and 42% of the donor insemination parents wishing to protect the father.

Regarding disclosure to other people, there was a significant difference between family types in the proportion of parents who had told at least one other person about the nature of the child's conception, $\chi^2(2, n = 116) = 14.66, P < 0.01$. All of the surrogacy parents had done so, whereas only 83% of the oocyte donation parents and 66% of the donor insemination parents had told someone else. There was also a difference between family types with respect to disclosure to maternal, $\chi^2(8, n = 88) = 21.13, P < 0.01$ and paternal, $\chi^2(1, n = 88) = 27.02, P < 0.001$, grandparents. The proportion of parents who had

Table II. Means, SD, F and P values for comparisons of quality of parenting between family types

| | Surrogacy | | Donor insemination | | Oocyte donation | | Naturally conceived | | F | P | | Contrasts | | |
|--|-----------|-----|--------------------|-----|-----------------|-----|---------------------|-----|------|-------|-------|--------------|----------------|-------------|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | | | | AR versus NC | OD/S versus DI | OD versus S |
| Mothers | | | | | | | | | | | | | | |
| Expressed warmth | 4.41 | .70 | 4.24 | .58 | 4.44 | .63 | 4.00 | .75 | 4.59 | <0.01 | <.001 | NS | NS | |
| Emotional over-involvement | .32 | .53 | .27 | .54 | .41 | .54 | .20 | .44 | .41 | NS | – | – | – | |
| Mother-child interaction | 3.65 | .48 | 3.39 | .54 | 3.61 | .49 | 3.42 | .58 | 4.31 | <0.01 | <.05 | <.01 | NS | |
| Sensitive responding | 2.79 | .53 | 2.59 | .59 | 2.66 | .65 | 2.63 | .67 | 1.09 | NS | – | – | – | |
| Children | | | | | | | | | | | | | | |
| Strengths and Difficulties Questionnaire score | 7.40 | 3.6 | 7.68 | 3.7 | 7.72 | 4.1 | 6.54 | 3.8 | .177 | NS | – | – | – | |

AR, assisted reproduction; DI, donor insemination; NC, natural conception; OD, oocyte donation; OD/S, oocyte donation and surrogacy; S, surrogacy.

Table III. Experiences of gamete donation by family type

| | Surrogacy | | Donor insemination | | Oocyte donation | | χ^2 | <i>P</i> |
|----------------------------|-----------|-----|--------------------|----|-----------------|----|----------|----------|
| | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | | |
| Telling child | | | | | | | | |
| Told | 15 | 44 | 2 | 5 | 3 | 7 | 40.30 | <0.001 |
| Plans to tell | 18 | 53 | 16 | 39 | 25 | 61 | | |
| Uncertain | 1 | 3 | 4 | 10 | 4 | 10 | | |
| Plans not to tell | 0 | 0 | 19 | 46 | 9 | 22 | | |
| Told other people | | | | | | | | |
| Yes | 34 | 100 | 27 | 66 | 34 | 83 | 14.66 | <0.01 |
| No | 0 | 0 | 14 | 34 | 7 | 17 | | |
| Told maternal grandparents | | | | | | | | |
| Told | 23 | 92 | 16 | 50 | 20 | 64 | 21.13 | <0.01 |
| Plans to tell | 1 | 4 | 0 | 0 | 2 | 7 | | |
| Uncertain | 0 | 0 | 2 | 6 | 0 | 0 | | |
| Plans not to tell | 0 | 0 | 14 | 44 | 8 | 26 | | |
| Not applicable | 1 | 4 | 0 | 0 | 1 | 3 | | |
| Told paternal grandparents | | | | | | | | |
| Told | 22 | 100 | 8 | 28 | 19 | 56 | 27.02 | <0.001 |
| Plans to tell | 0 | 0 | 1 | 4 | 2 | 6 | | |
| Uncertain | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Plans not to tell | 0 | 0 | 19 | 68 | 13 | 38 | | |
| Not applicable | 0 | 0 | 0 | 0 | 0 | 0 | | |

been open with maternal grandparents was 92% for surrogacy families, 65% for oocyte donation families and 50% for donor insemination families. For paternal grandparents, the proportion who had been open was 100%, 56% and 29% for surrogacy, oocyte donation and donor insemination families, respectively.

With respect to contact with the surrogate mother, 50% of commissioning mothers, 38% of commissioning fathers and 44% of children in surrogacy families had seen the surrogate mother at least once every 3 months in the previous year, with 34, 28 and 31% of mothers, fathers and children respectively having seen her at least once per month. Most commissioning parents reported a harmonious relationship with the surrogate mother, with only 6% of commissioning mothers and 9% of commissioning fathers experiencing some dissatisfaction or coldness in the relationship, and none experiencing major conflict or hostility. Only one commissioning mother expressed some ambivalence regarding the surrogate mother's contact with the child. Of the nine sets of parents whose oocyte donation child was born with the help of a known donor, 89% of mothers, 38% of fathers and 78% of the children had seen the donor at least once every 3 months in the previous year, with 33% of mothers, 22% of fathers and 22% of children having had contact at least once per month. With the exception of one set of oocyte donation parents, all felt positive about their relationship with the oocyte donor. None of the mothers expressed concern about the oocyte donor's involvement with the child.

Discussion

The findings of this follow up when the children were 3 years old are in line with those of earlier phases of the study in showing that the absence of a genetic or gestational link between the mother and the child does not appear to impact negatively on

parent-child relationships. In fact, to the extent that differences in parent-child relationships were found between family types, these reflected higher levels of warmth and interaction between mothers and their 3-year-old children in the assisted reproduction families than in the comparison group of families with a naturally conceived child. The more positive findings for mother-child relationships in assisted reproduction families are similar to those obtained at age 1 (Golombok *et al.*, 2004a,b) and at age 2 (Golombok *et al.*, 2005, 2006). With respect to psychological well-being, no differences were identified between family types for either parents or children as assessed by standardized measures, with mothers, fathers and children found to be functioning within the normal range. The lower levels of parenting stress observed in mothers and fathers in surrogacy families at age 1 (Golombok *et al.*, 2004b) and by fathers in surrogacy families at age 2 (Golombok *et al.*, 2005) appear to have disappeared by age 3.

An issue of interest in this study was whether differences in parenting existed between families where the mother lacked a genetic and/or gestational link with the child and families where it was the father who lacked a genetic link. The only difference found was for the level of mother-child interaction, with the surrogacy and oocyte donation mothers showing higher levels of interaction with their child than the mothers of children conceived by donor insemination. This finding is surprising as it might be expected that mothers who lack a biological link with their child would interact less with their child than biologically related mothers. However, it may be that women who are unable to conceive or carry a child themselves may become especially committed to parenting when they eventually become mothers or may try to compensate for the absence of a genetic or gestational link. The DI mothers may be more akin to the natural conception mothers in this respect because they are the genetic and gestational mothers of their

child. An alternative explanation for the significant difference between non-biological and biological mothers for mother–child interaction is that it may have resulted from chance. Although this possibility cannot be ruled out, a multivariate analysis was used to reduce the likelihood of chance effects. It should be noted that there were no differences between families where the mother lacked a biological link with the child (surrogacy and oocyte donation) and families where the father lacked a biological link with the child (donor insemination) for either the mothers', the fathers' or the children's psychological well-being.

A further question of interest was whether differences existed in parenting, or in parents' or children's psychological well-being, between the oocyte donation families and the surrogacy families, i.e. according to whether or not the mother experienced the pregnancy and birth. Although the opportunity to bond with the child during pregnancy, a process that has been associated with more positive mother–child relationships (Laxton-Kane and Slade, 2002), might lead to the prediction of more positive outcomes for the oocyte donation families, no differences were found between the oocyte donation families and the surrogacy families for any of the variables under study. This may have arisen from the fact that many of the commissioning mothers maintained contact with the surrogate mother during the pregnancy and felt highly involved.

The findings relating to parents' experiences of assisted reproduction showed that couples who had become parents through a surrogacy arrangement were much more likely to have been open with their child about the circumstances of their birth than were couples whose children had been conceived by gamete donation. Perhaps surprisingly, as it is generally believed that fathers are more sensitive about the absence of a genetic link with their child than are mothers, there was little difference between the proportions of oocyte donation and donor insemination parents who had disclosed this information to their child. In spite of the greater encouragement in recent years of parents to tell their children about the method of their conception, less than 8% of oocyte donation parents and less than 5% of donor insemination parents had begun to do so by the time of the child's third birthday. This contrasts sharply with the finding that 56% of these same oocyte donation parents and 46% of these donor insemination parents reported when their child was 1 year old that they planned to tell their child about the donor conception (Golombok *et al.*, 2004a). Although some of these parents may discuss this issue with their children as they grow older, it is generally advised that parents should begin this process at a very early age. The discrepancy between the surrogacy parents and the gamete donation parents regarding disclosure to the child most probably results from the fact that the latter experience a pregnancy and can keep the donor conception secret from family and friends whereas the absence of a pregnancy in surrogacy families increases the likelihood that the child will find out from someone else. The most common reason given by surrogacy parents for telling their child is to avoid disclosure by someone else, with 59% of surrogacy parents citing this reason. Although the same proportion of donor insemination parents gave this reason for disclosure, very few of these parents had actually told their child.

Regarding disclosure to grandparents, it is interesting to note that the surrogacy parents were most likely to tell followed by oocyte donation parents. Only half of the donor insemination parents were open about the donor conception to maternal grandparents and less than one-third told paternal grandparents. This finding suggests that donor insemination is associated with greater stigma than is oocyte donation and that the reaction of paternal grandparents to the knowledge that their grandchild is genetically unrelated to them is expected to be more negative than that of maternal grandparents. Once again, the high proportion of grandparents in surrogacy families who had been told is most likely related to the absence of a pregnancy.

Not only do the findings of this study show that the absence of a genetic and/or gestational link between parents and their child does not appear to jeopardize the development of positive family relationships but also the findings replicate those obtained from previous samples of donor insemination (Golombok *et al.*, 1995) and oocyte donation families (Golombok *et al.*, 1999) with children of a similar age. Although it was expected from their reported intentions when their child was aged 1 that more of the gamete donation parents would have begun to discuss with their children the circumstances of their birth, it seems that these intentions had not been acted upon by the time the child turned 3 years old. In contrast, many of the commissioning parents in surrogacy families had begun to discuss this issue with their child, showing that children at age 3 have at least a rudimentary understanding of the concepts of conception and childbirth. It may be the case that it is more difficult to explain gamete donation than surrogacy to a young child as an understanding of gamete donation needs a greater knowledge of the process of conception than does surrogacy, which only requires some knowledge of childbirth (Cook *et al.*, 1995; Murray and Golombok, 2003). However, it is more likely that parents with children conceived by gamete donation have not yet begun to discuss this issue because many find the topic difficult to broach, because they are concerned about the impact on family relationships, and because the presence of a pregnancy means that there is less need to tell.

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